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THREAT ASSESSMENT
IN THE
NEW WORLD ORDER

A THESIS
Presented to
The Academic Faculty

by

Cyrus E. Holliday

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DEDICATION

This thesis is dedicated to the soliders, sailors, airmen and marines who deployed, fought and died during the Persian Gulf War. They brought honor to the profession of arms.

Statement A per telecon Capt Jim Creighton
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Table of Contents

	Page
DEDICATION	ii
LIST OF TABLES	v
LIST OF FIGURES	ix
LIST OF ABBREVIATIONS	x
SUMMARY	xi
Chapters	
I. Introduction	1
Explanation of balance of power theory, global and regional balances of power, the emerging new world order, threat assessment and the role of U.S. security assistance	
II Methodology	15
An explanation of the case study, its hypotheses and the introduction of the countries to be studied	
III. Checkbook Defense	23
Explaining the problem in financial terms	

Table of Contents (continued)

	Page
IV. Bean Counts	41
Explaining the problem in terms of numbers and types of weapons.	
V. Combat Potential	58
Explaining the problem based on a qualitative assessment of the weapons Introduction of the Arms Sales Threat Assessment (ASTA) model.	
VI. Combat Capability	74
Explaining the problem based on a mixture of qualitative and quantitative factors. Introduction of the Predictive Intelligence Estimate (PIE) model.	
VII. Conclusions	86
Appendix I - Standard Units of Armament	108
Appendix II - Combat Potential Worksheets	112
Appendix III - Regression Analysis	118
Appendix IV - Demographic Data	120
Appendix V - Combat Capability Worksheets	123
Appendix VI - Questionnaire	164
Bibliography	175

LIST OF TABLES

<u>TITLE</u>	<u>PAGE</u>
1. Iraq - 1985.....	24
2. Kuwait - 1985.....	25
3. Saudi Arabia - 1985.....	26
4. Comparisons - 1985.....	27
5. Iraq - 1986.....	28
6. Kuwait - 1986.....	28
7. Saudi Arabia - 1986.....	29
8. Comparisons - 1986.....	29
9. Iraq - 1987.....	30
10. Kuwait - 1987.....	30
11. Saudi Arabia - 1987.....	31
12. Comparisons - 1987.....	31
13. Iraq - 1988.....	32
14. Kuwait - 1988.....	32
15. Saudi Arabia - 1988.....	33
16. Comparisons -1988.....	33
17. Iraq - 1989.....	34
18. Kuwait - 1989.....	35
19. Saudi Arabia - 1989.....	35

LIST OF TABLES (continued)

<u>TITLE</u>	<u>PAGE</u>
20. Comparisons - 1989.....	36
21. Iraq - 1990.....	36
22. Kuwait - 1990.....	37
23. Saudi Arabia - 1990.....	37
24. Comparisons - 1990.....	38
25. Summary of Expenditures.....	39
26. Summary Comparison.....	39
27. Bean Counts - 1985.....	45
28. Functional Categories - 1985.....	45
29. Bean Counts - 1986.....	46
30. Functional Categories - 1986.....	47
31. Bean Counts - 1987.....	48
32. Functional Categories - 1987.....	49
33. Bean Counts - 1988.....	50
34. Functional Categories - 1988.....	50
35. Bean Counts - 1989.....	51
36. Functional Categories - 1989.....	52
37. Bean Counts - 1990.....	53
38. Functional Categories - 1990.....	53
39. Coalition Bean Count.....	57
40. Coalition Functional Categories.....	57
41. Similar But Not Equal.....	59
42. Kuwait/Saudi 01 August 1990.....	60

LIST OF TABLES (continued)

<u>TITLE</u>	<u>PAGE</u>
43. Iraq 01 August 1990.....	61
44. Iraq - Combat Potential.....	62
45. Kuwait/Saudi Combat Potential.....	63
46. COF - Combat Potential.....	64
47. COF - Functional Categories.....	64
48. Colation Weapons - 16 January 1991.....	72
49. COF - Combat Potential.....	73
50. COF - Functional Categories.....	73
51. CC Adjustment Factors - Iraq.....	78
52. Combat Capability - Iraq.....	79
53. CC Adjustment Factors - Kuwait/Saudi.....	80
54. Combat Capability - Kuwait/Saudi.....	80
55. CC Adjustment Factor Comparison.....	81
56. COF - Combat Capability.....	82
57. COF - Functional Categories.....	83
58. CC Adjustment Factors - Coalition.....	84
59. Combat Capability - Coalition.....	85
60. COF - Combat Capability.....	85
61. COF Comparison.....	87
62. Meeting the Requirement - BC.....	88
63. Meeting the Requirement - CP.....	89
64. The Difference.....	90
65. COF Comparison - Coalition.....	91

LIST OF TABLES (continued)

<u>TITLE</u>	<u>PAGE</u>
66. Meeting the Requirements - BC.....	92
67. Meeting the Requirements - CP.....	93
68. The Difference.....	94
69. COF Comparison.....	95
70. The Difference.....	96
71. COF Comparison - Iraq.....	99
72. The Difference.....	100

LIST OF FIGURES

<u>TITLE</u>	<u>PAGE</u>
1. World Conflicts.....	5
2. Arms Export Market Share.....	12
3. Defense Spending Patterns.....	40
4. Iraq Weapons - 1990.....	54
5. Kuwait/Saudi Weapons - 1990.....	55
6. Iraqi Combat Potential.....	66
7. Kuwait/Saudi Combat Potential.....	67
8. Arms Sales Threat Assessment (ASTA)...	70
9. Combat Potential Required.....	71
10. Heuristic Comparison.....	98
11. U.S. Military Action.....	105

LIST OF ABBREVIATIONS

A

ACFT	Aircraft
AD	Air Defense
Air Def	Air Defense
APC	Armored Personnel Carrier
Arty	Artillery
AT	Anti-tank
ATK	Attack

C

CBT	Combat
CC	Combat Capability
COF	Correlation of forces
CP	Combat Potential

H

Helo	Helicopter
------	------------

I

IFV	Infantry Fighting Vehicle
I-TOW	Improved Tube Launched, Optically Tracked Weapon

M

Mech	Mechanized
MLRS	Multiple Launch Rocket System
MRL	Multiple Rocket Launcher

SUMMARY

This case study explains various methods of justifying a nation's request to purchase, or receive via grants or aid, modern weapons from the United States. It examines the weapons acquisitions of Iraq, Kuwait and Saudi Arabia over the six year period from 1985 through 1990. These weapons acquisitions are examined in light of classical balance of power theory as they relate to a regional balance of power condition.

The weapons amassed by each country are analyzed in terms of dollar expenditures; percentage of Gross Domestic Product allocated for defense; type of and numbers of weapons purchased (bean counts); technical characteristics of the weapons (combat potential) and the capability of the countries to use the weapons they have purchased (combat capability). Significant differences were found between each level of analysis when the results are compared to a universally accepted heuristic describing the military requirements for defensive sufficiency. Based on the study's findings, two models are created that can assist defense planners in determining the weapons requirements of nations requesting security assistance from the United States.

CHAPTER I

INTRODUCTION

The world order has changed dramatically over the past 5 years. The East - West confrontation that dominated the political scene has evaporated with the collapse of the Soviet Union. This is not to say that the emerging "new world order" is now, or will become, one of peace and harmony. The Persian Gulf War of 1991 was an excellent example of how "new" and "safe" are not synonymous.

As the new world order emerges the United States will play a significant role in its eventual shape. One of the ways which the U.S. will shape the new world order is through the process of security assistance to its friends and allies. This case study will examine the participants in the Persian Gulf war with respect to the amount and type of security assistance they received prior to the initiation of hostilities in August of 1990.

None of the Middle Eastern countries possess the scientific, technological or manufacturing expertise to supply their own military forces with modern weapons.

This being the case, the participants in the Gulf War provide excellent examples of the impact of security assistance on regional balance of power calculations. For the purpose of testing two hypotheses for this case study, the military capabilities of three members of the Middle East regional balance of power equation are examined prior to the invasion and subsequent occupation of Kuwait (Iraq, Kuwait and Saudi Arabia). A parallel analysis of the coalition forces opposing Iraq immediately prior to the beginning of the Persian Gulf War is also conducted.

First, the defense expenditures of each of the countries mentioned above is examined for the period 1985 through 1990. Next, the numbers and types of weapons available to the armed forces of the countries in question is examined for the same 6 year period. A quantitative look at the capabilities of the weapons available to the opposing sides at the beginning of Iraq's invasion of Kuwait and of the coalition forces weapons prior to their subsequent action against Iraq is the third step. Finally, a qualitative assessment of the opposing sides completes the analysis.

The remainder of this introductory section will focus on explaining the key elements of the study. This is intended to provide definitions for the reader who may

be uninitiated in the jargon of balance of power theory in general and security assistance in particular. Readers who are well versed in these areas may wish to proceed directly to the second chapter.

Balance of Power Theory:

There are a variety of well known balance of power theories that attempt to explain the actions amongst states in the international system. Each theory has its own twist to distinguish it from another, however, there are some constant themes which run the gamut from Thucydides to Kissinger. The theorists themselves inevitably follow the realist school of thought that describes man as a natural seeker of power and the societies which men form as being in a constant state of competition for scarce resources. The first, and possibly the most important, recurring theme is that the international system is anarchic and as such contains no supranational arbiter or power that would prevent a state from becoming a hegemonic power. All of the prominent theorists describe the international system as being anarchic.

Throughout history the most prevalent outcome of this anarchic condition has been some form of hostility, usually war, between the nation state actors that comprise the international system. This condition has

been predominant, regardless of the nature of the balance of power arrangement, (bi-polar, multi-polar) since the beginning of recorded history. William R. Hawkins provides a brief review of earlier contests between states and a prediction for the future:

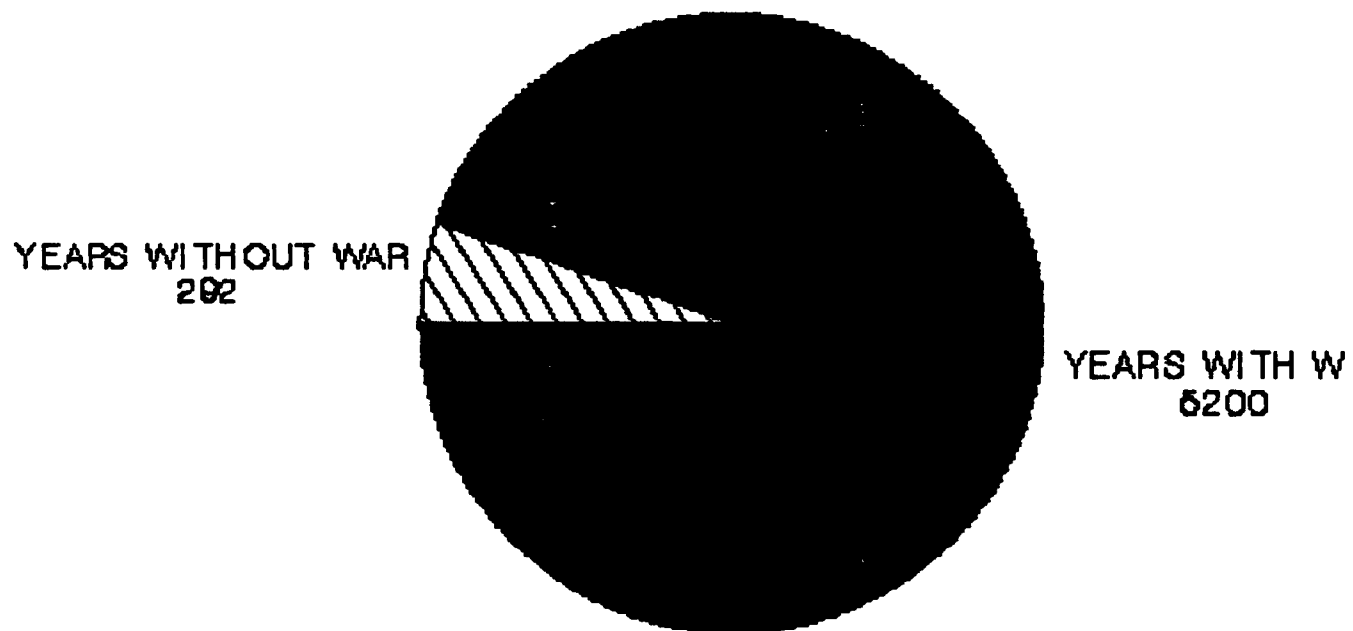
A 1989 study by the Norwegian Academy of Sciences determined that since 3500 B.C. there had been 14,531 wars with only 292 years of peace over the entire span of 5,589 years studied. There have been 400 wars fought in the past 200 years and there were 17 wars in progress in 1989. The breakup of the Communist world will not mean the end of war. (1)

Figure 1 on the following page provides a graphic portrayal of this state of near constant war and expands Hawkin's original quotation to the current year. There have been no years between 1989 and 1992 which could be added to the 292 peaceful years mentioned earlier.

Perhaps the best description of the anarchic condition comes from Kenneth Waltz. In his work, Theory of International Politics; Man, State and War, Waltz outlines what he refers to as a "self help" system. The self help system is one in which states that fail to help themselves, or do so less effectively than other states, will fail to prosper. Thus, with no international arbiter to protect their interests, the fear of the undesirable consequences (i.e. another state helping

1. William R. Hawkins, "New Enemies for Old", National Review, 17 Sep 1990, pg. 28

FIGURE 1
WORLD CONFLICTS



itself to their disadvantage), motivates the nation-states to create and participate in a balance of power system.

Thucydides is generally credited to be the first to address the existence of a balance of power system. In his "A History of the Peloponnesian Wars", Thucydides implies the first general principle (anarchy) and introduces a second. That being the condition that power regardless of its source, (economic, military, societal, institutional et. al.), is both relative and ever changing.

Gilpin's classic expansion of Thucydides, his Theory of Hegemonic War, gives an excellent description of this second general theme. In general Gilpin's expansion of Thucydides follows these lines: The international system is characterized as being stable so long as a dominant or hegemonic power exists. Because the nature of power is transitory and both growth and decline are unequal, one of the lesser states eventually grows in power until it reaches parity with the hegemon.

At this point, the system is characterized as being bi-polar. Since there is no supranational power and no longer a hegemonic power, conflict is inevitable between the two states and will continue until such time as one or the other emerges as the new hegemon. Once the new hegemon emerges the system stabilizes and the process repeats itself.

Hans Morganthau's treatment of balance of power theory best describes the next recurring theme, the existence of dominant and dependent balance of power systems within the global balance of power scheme. Morganthau's theory contains both of the themes previously mentioned. He expands upon the balance of power concept by adopting the notion that the global balance of power arrangement actually contains more than one balance of power equation. In Morganthau's schema, there exist both dominant and dependent states at the major power level, such as the U.S. and former U.S.S.R. being the dominant states of a bi-polar system and all other nations being dependent.

Additionally, there are dominant and dependent regional balances of power, each with its own set of dominant and dependent states. An example would be the Middle East with (pre-January 1991) Iraq as the dominant power and the other states in the region being the lesser powers. Sub-Saharan Africa could be seen as containing at least 5 regional balance of power systems, the Horn, East Africa, West Africa, central Africa and South(ern) Africa. The more important a region is to the dominant states at the global level in terms of economics, raw materials or geostrategic position, the greater the

possibility that the dependent system would lose its autonomy to that of the dominant system. As Morgenthau states:

The more intimately a local balance of power is connected with the dominant one, the less opportunity it has to operate autonomously and the more it tends to become merely a localized manifestation of the dominant balance of power. (2)

Morgenthau also provides us with a fairly comprehensive list of the elements of national power. These include military power, economic power, geostrategic position, presence of raw materials, industrial capacity, scientific and technological capacity, population base and diversity, national will, national character, the quality of government, the quality of diplomacy, the quality of society and the means to project national power. These elements of national power will exist to some form in any nation regardless of whether it occupies a position in a global or regional balance of power arrangement.

Security Assistance

The transfer of weapons to foreign governments has been a major part of U.S. foreign policy formulation and practice since the days of the Revolutionary War. Ever since the colonists armed various Indian nations to

2. Morgenthau, Hans, *Politics Among Nations: the Struggle for Power and Peace*, (McGraw-Hill, New York, 1985) pg. 219.

secure their support against the British, the process of providing U.S. arms to foreign nations in hopes of obtaining a foreign policy goal has continued. (3) Today, this procedure is referred to as security assistance. While the process has been continuous, in terms of dollar amounts it has only become significant in the last half of the 20th century.

The U.S. is not alone in this activity. Virtually every industrialized nation in the world has sold, traded or given arms to foreign nation since the late 1800s. The principle difference between the U.S. and the rest of the industrialized and emerging economic nations is that today, and in fact since the late 1970s, the U.S. is the only ideologically motivated supplier of weapons.

The remainder of the arms exporting countries, including the former Soviet Union since the late 1970s, are primarily economically motivated. There is some disagreement as to when the Soviet Union changed its policy from ideological to economic motivation. Salomone and Louscher place the Soviets in the economic camp in 1980.

Whatever the complexities and changes of the 1950s through 1980s when the United States and the Soviet Union dispersed arms to friends and allies considered critical to the maintenance or revision of the East - West geostrategic balance, most

3. For an excellent description of this process see Geoffrey Perret's "A Country Made by War", (Random House, New York, 1989) especially Chapters 2,5,9,15,17 and 20.

deliveries were the result of careful political analysis and political decision. In the 1980s and to the end of the century, however, it can be expected that an increasing proportion of arms deliveries will result from economically motivated decisions. (4)

While some place the Soviet transition a few years earlier (mid-1970s) there is no doubt that today, the Commonwealth of Independent States is an economically motivated supplier of arms. As Fred Hiatt reported in the Washington Post National Weekly Edition:

"Today, trading in arms is a necessity for us," Russian president Boris Yeltsin said... "Soviet weapons are highly popular in the world and we easily find buyers". (5)

For the majority of the 20th century, less so in the first half but exclusively in the second, the U.S. has been a proponent of the maintenance of both global and regional balances of power. Security assistance, in the form of grants, aid or direct sales has increased in importance as a key element in the implementation of U.S. foreign policy since the end of World War II.

Additionally, since the end of WWII, all nations of the world have viewed the acquisition of modern weapons as being a key element in the maintenance of their sovereignty. Often, the ability to provide weapons

4. Louscher, David and Salomone, Michael, Marketing Security Assistance, (Lexington Books, Lexington, Mass. 1987) pg. 6

5. Hiatt, Fred, "Russia is Responding to a Call to Arms Sales", The Washington Post National Weekly Edition, (March 2, 1992) pg. 18.

systems and their associated technology has been the only area of commonality between U.S. foreign policy interests and recipient nations national security interests.

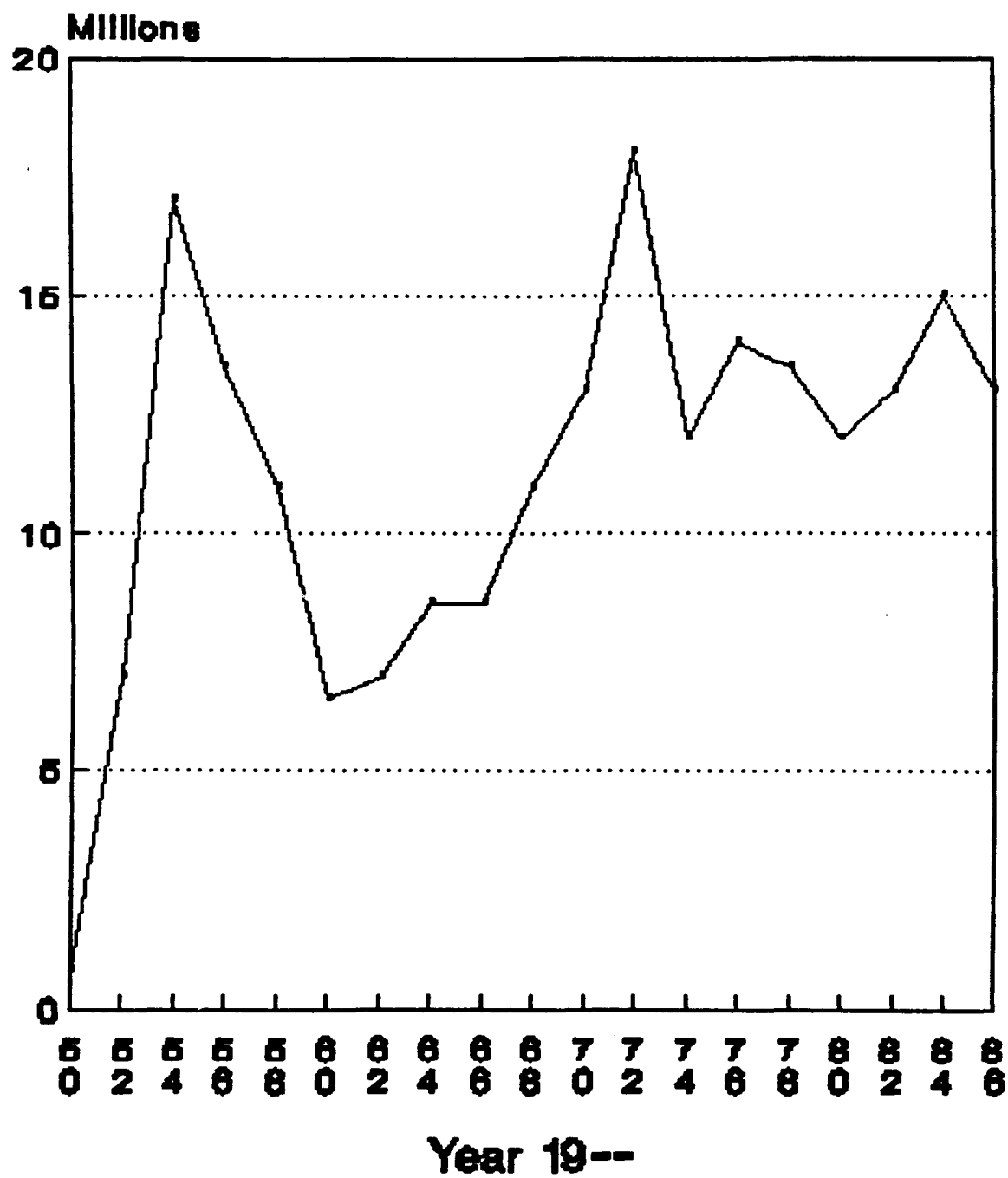
This has been most particularly true with the nations which developed as a result of the end of the old colonial empires after WWII. The major competitors were the U.S. and the U.S.S.R. The real competition began in the 1960s as the Soviet declaratory policy of supporting wars of national liberation ran headlong into the U.S. policy of containment. Europe, both East and West, had been stabilized by this time after large doses of security assistance, primarily in the form of grants from existing WWII stockage.

The area of competition in the foreign policy arena shifted then to Asia, the Middle East, Latin America and Africa. The emerging nations in these areas needed weapons to secure their fledgling governments from attacks by external and/or internal threats. While other forms of foreign policy issues were pursued by the U.S., the most successful, at least in terms of gaining the initial support of a foreign government, was security assistance.

Figure 2 (6) on the following page depicts the dollar value, in constant 1985 dollars, of U.S. security

6. Louscher, David and Salomone, Michael, Marketing Security Assistance, (Lexington Books, Lexington, Mass. 1987) Figure 2-2, pg. 21

Figure 2
U.S. Security Assistance (1985 Dollars)



assistance world wide since 1950. The spikes follow the patterns of U.S. foreign policy. In the early 50s the rearmament of Europe and the Korean War were the major concerns. In the mid-60s, the Middle east and Viet Nam caused the rise in arms exports. The early 70s shows a spike associated mainly with turmoil in the Middle East. The rise in the 80s was the result of the modernization of NATO and continuing shipments to the Middle East. While much has been made in the press concerning security assistance to Sub-Sahahran Africa and Latin America, those two regions combined have never amounted to more than 7% of the total annual export of military equipment.

U.S. foreign policy was guided by National Security Council Directive 68 (NSC-68) from 1950 until the collapse of the Soviet Union as a world power in 1989. The fundamental goal of NSC-68 was the containment of communism. Containment would also allow the realization of other major foreign policy goals which have remained relatively consistent since the founding of the U.S. Those goals include the establishment and protection of free trade markets; the protection of sea lines of communication; the protection of U.S. citizens and property abroad and the encouragement and protection of democratic forms of government in other nations.

The collapse of the Soviet Union has, for the most part, fulfilled the conditions of NSC-68. This has not, however, brought about a significant decrease in the importance of security assistance. The success of U.S. weapons in the Gulf War has resulted in a quantum leap in requests from foreign governments for the latest in U.S. weaponry. Some, primarily the oil producing nations in the Middle East, can afford to purchase the weapons. Most other nations which look on the U.S. as an ally or potential ally cannot afford, and for the most part do not need these advanced weapons systems.

The dilemma is obvious. The U.S. being the sole remaining ideological supplier of arms, attempts to show restraint where it can. Other arms exporting nations, all economically motivated, show no such restraint. This lack of restraint in pursuit of short-term profit as opposed to long term foreign policy goals risks upsetting the, often delicate, regional balances of power. To counter this threat, the U.S. must be able to accurately determine the security requirements of potential recipient nations. How those assessments are made is the focus of this thesis.

CHAPTER II

METHODOLOGY

Given that security assistance is, if not the cornerstone, at least a very important tool in the conduct of U.S. foreign policy, how can a potential recipient's requirements be determined? There is a tremendous amount of, often conflicting, data available relevant to weapons transfers. The vast majority of the literature available on worldwide weapons transfers in general and U.S. security assistance in particular, describes the process in economic terms. These studies focus on the defense expenditures of a particular country and the percentage of Gross Domestic Product (GDP) the nation allocates to defense.

While this information may be useful for quantifying the fact that modern weapons are expensive and that all nations buy weapons, it fails to address the crux of the security assistance problem. That being, how much is enough to provide defensive sufficiency? The purpose of this research is to address the problem of defensive sufficiency.

There is a universally accepted heuristic that a military force can successfully defend if it is opposed by a force not more than 3 times stronger than itself. This combat power ratio or correlation of forces is usually written, 3 : 1 (attacker : defender). The 3 : 1 rule has been codified throughout history in the military writings of Napoleon and von Clausewitz and can be found today in military manuals dealing with the mechanics of conventional (not nuclear) warfare.

What has not been adequately codified is exactly what 3 : 1 means. Does it relate to a given nation's ability and proclivity to invest in weapons? Is it simply a count of enemy and friendly weapons? Is it a quantitative measure of the capabilities of these weapons? Or, is it a qualitative measure, concerned with the abilities of the personnel on the opposing sides to employ the weapons?

Perhaps the greatest criticism of the U.S. military establishment after the Persian Gulf War was their failure to properly estimate the strength of the Iraqi forces. As Norman Friedman points out;

"To the extent that intelligence failed during the Gulf War, that failure can probably be laid to the decision, explicit and implicit, that intelligence should be focused on how many tanks Iraq had rather than the quality of their crews and maintenance" (7)

7. Friedman, Norman, Desert Victory: The War for Kuwait, (Naval Institute Press, Annapolis, Md., 1991) pg. 237

Two questions are critical in this regard. First, how can we determine the weapons requirements of a nation or region that we wish to influence through the foreign policy process? Second, having fulfilled the requirement in terms of numbers of weapons, how can we predict the performance of the forces armed with these weapons?

To answer these questions, this thesis takes the form of an explanatory case study, similar in design to Graham Allison's classic study of the Cuban missile crisis. In Allison's case study, three different models of organizational theory were used to explain the events of the Cuban missile crisis. In this study, the military preparedness element of balance of power theory takes the place of organizational theory. The theory is operationalized with the 3 : 1 heuristic mentioned earlier.

To be considered "militarily prepared" a nation will meet or exceed the 3 : 1 correlation in terms of its expenditure of GDP on defense; the raw numbers of military hardware (weapons) in its inventory (bean count); the quantitative assessment of its weapons (combat potential) and the qualitative assessment of its armed forces (combat capability).

The case study will examine the 6 year period from 1985 through 1990. It focuses on the defense expenditure, weapons procurements and military capabilities of Kuwait,

Saudi Arabia and Iraq. The actions of these three nations will be explained in terms of classical balance of power theory in a regional balance of power context.

HYPOTHESES

The two general questions above are restated here as Hypotheses 1 and 2:

Hypothesis 1: That the correlation of forces between two opposing sides is significantly different on a quantitative scale (Combat Potential) than on a numeric scale (bean count).

Hypothesis 2: That the correlation of forces between two opposing sides is significantly different on a mixed quantitative and qualitative scale (Combat Capability), than on either a strictly quantitative (Combat Potential) or a numeric (bean count) scale.

DEFINITIONS

This is a highly specialized area of study that has developed its own language and jargon. The following set of operational definitions are provided to assist the general reader in understanding the concepts as they are presented.

Bean Count: The bean count is the simplest of all forms of measurement of combat power. It counts and sums like weapons systems. One nation may have 500 tanks, another 400. The bean count assumes that all like weapons (tanks, artillery, aircraft et. al.) are equal.

Correlation of Forces (COF): The correlation of forces is a ratio of the strengths of the opposing sides expressed in the form Attacker : Defender. An example would be 4 : 1. In this example the attacker enjoys an advantage of 4 units to every 1 unit possessed by the defender. In terms of a bean count as described above, the COF in terms of tanks would be 500 to 400 or 1.25 : 1.

Combat Power: A numeric expression of the strength of a military unit or a combination of military units.

Combat Potential (CP): A measure of combat power of a force or force grouping that is adjusted for the type and quality of its weapons. These adjustments take into account the various technical aspects inherent to the weapon and reflect its relative weight under generalized combat conditions. The combat potential of a unit is the sum of the combat potential of its weapons. In effect, a heterogeneous force is given a homogeneous character in terms of its combat potential. The technical aspects inherent to the weapons are known as Standard Units of Armament (SUA) or Weapons Equivalent Weighted Values (WEWV). The adjustment of raw numbers (bean counts) into CP scores reflects the fact that all weapons of a similar type do not have the same technical characteristics.

SUA and WEWV: Standard methods for determining the combat potential of a heterogeneous force. Each weapon is

compared to a base weapon that, based on its technical characteristics, has been assigned a weight of 1. All other weapons are thereby given values or weights appropriate to their relative contributions to generalized combat conditions. The technical characteristics of the weapons are usually considered to be the following: Range; rate of fire; time to reload; probability of hitting a target with one shot (P_h); probability of killing a target with one shot (P_k); central error probable (CEP - the probability of a missile or projectile landing inside a circle if the weapon is fired twice at the same spot. The smaller the CEP the more accurate the weapon.); speed; self protection (thickness of armor); bursting radius of a missile or projectile (the lethal area covered by the explosion); fuel consumption; combat radius (how far the system can travel in one direction without having to be refueled to return to the original starting point); and for aircraft, avionics.

Combat Capability: This is another measure of combat power. The CC of a unit is determined through the use of various adjustment factors applied to its combat potential score through multiplication. The adjustment factors include, individual training, unit level training, maneuver, sustainment, command and control, fire support, intelligence, air defense, maintenance and

engineering support. The CC assessment is used to translate a unit's combat potential measure into a qualitative measure which better captures the essence of combat.

RESEARCH STRATEGY

To test the hypotheses a combination of techniques are employed. These include archival research, an explanatory case study, use of an expert panel and the employment of an open and closed ended questionnaire. The nature of the problem being studied has driven the selection of these strategies.

The case study examines the six year period from 1985 through 1990 with respect to both the dollar amounts spent on defense by Iraq and the alliance of Kuwait and Saudi Arabia and the percentage of GDP allocated to defense by each of those nations. This archival research results in two sets of figures. One, a year to year and composite dollar expenditure (Chapter 3), and the other, a count of weapons, by type for each country (Chapter 4).

The Chapter 4 bean count is then adjusted into combat potential scores for each nation in Chapter 5. These scores are further refined into combat capability scores in Chapter 6. This transition is accomplished with the assistance of the expert panel mentioned earlier.

The expert panel, 50 field grade military officers (Majors, Lieutenant Colonels and Colonels) were asked to

weight the 10 variables associated with combat capability. Each variable is weighted from 0, representing no capability to 1, representing full capability.

In Chapters 4 through 7, in addition to the Iraq vs. Kuwait and Saudi Arabia analysis, a parallel analysis of the U.S. led coalition force vs. Iraq is conducted. At each level of analysis the correlation of forces is the dependent variable. The independent variables for the first model are fiscal expenditures for defense. The independent variables in the second model are the raw numbers of weapons in the inventories of each nation. Combat potential is the independent variable in the third model. Finally, combat capability is used as the independent variable in the fourth model.

CHAPTER III

CHECKBOOK DEFENSE

The vast majority of literature and media coverage dealing with security assistance focuses on the amount of money individual countries spend on weapons. This data is often incomplete, contradictory and in some cases just plain incorrect. This study has utilized 2 principle sources, Military Balance and the Stockholm International Peace Research Institute Annual Yearbook, for its data concerning both defense expenditures and the numbers of weapons in the inventories of Iraq, Kuwait and Saudi Arabia. The accuracy of the sources cannot be confirmed. All dollar figures listed in this chapter are in constant 1988 U.S. dollars.

Iraq -1985

In 1985 Iraq was in the middle of its long war with Iran. The prosecution of a war, even a static war as was the character of the Iran - Iraq conflict is an expensive proposition. As such, defense expenditures could well be expected to be out of proportion with the norm, even in a country which clearly had hegemonic designs in the region.

This obviously appears to be the case with Iraq in 1985. as Table 1 shows, some 57% of Iraq's Gross Domestic Product, (GDP) was spent on defense related items.

TABLE 1

IRAQ - 1985

GDP	-	\$22.515 Billion
DEFENSE EXPENDITURES	-	\$12.816 Billion
PERCENTAGE SPENT ON DEFENSE	-	57%

Little more needs to be said about this particular year. Iraq was involved in a war. Even as it prosecuted that effort, it continued to build its military in terms of both raw numbers of men and equipment.

Kuwait - 1985

Kuwait is one of the smallest of the Middle East nations in terms of land size, population and the size of its military. It maintains a small Navy, and Air Force and only one Army Brigade for its defense. With an aggressive and powerful neighbor like Iraq and the growing threat of a Moslem fundamentalist uprising sponsored by Iran, we would expect Kuwait to spend a goodly measure of its national wealth on defense.

The public position of all of the Arab nations was, and for the most part continues to be, that their prime

threat was Israel. All weapons procurements were made against the day when these nations would have to defend themselves from an attacking Israeli force, or, participate in a joint Arab attack on Israel.

As Table 2 shows, Kuwait spent a good deal of its national treasure on its small military. While this sum appears paltry compared to its neighbors, (Iraq and Saudi Arabia) in terms of percentage of GDP it is more than double that which most NATO countries spend on defense.

TABLE 2

KUWAIT - 1985

GDP	-	\$24.474 Billion
DEFENSE EXPENDITURES	-	\$1.827 Billion
PERCENTAGE SPENT ON DEFENSE	-	7%

Saudi Arabia - 1985

The Saudi military is small when compared to the military giants of the region (Egypt, Syria, Iraq and Iran). It is, however, well equipped. The ruling Saud family comes from the Wahabi tribe of the central desert region. The Wahabis have always considered themselves to be warriors and, as such, have spared little expense when it comes to supporting their military, at least in terms of hardware.

As Table 3 shows, the Saudis dollar expenditure in 1985 was nearly double that of Iraq, a nation with a 2 million plus man army embroiled in a war.

TABLE 3

Saudi Arabia - 1985

GDP	-	\$93.653 Billion
DEFENSE EXPENDITURES	-	\$22.674 Billion
PERCENTAGE SPENT ON DEFENSE	-	24%

What can be made of all of this? Unfortunately, very little. Aside from the fact that the procurement of modern weapons is expensive, and that all countries, especially Middle East countries, purchase weapons, much more information is required to determine anything other than some possible trends and comparisons.

Table 4 is a comparison of defense expenditures of Iraq and the combination of Kuwait and Saudi Arabia. As we see in terms of dollars expended, the two much smaller militaries outspent Iraq almost 2 : 1 despite the fact that Iraq was involved in an ongoing war. This does indicate at least a willingness on the part of Kuwait and the Saudis to spend large amounts on their military forces.

If willingness to spend were the only criteria, then one could reasonably expect that Kuwait and Saudi Arabia

were more than a match for their powerful neighbor. The second part of the table refers to the percentage of GDP allocated to their military. The percentage of GDP expended is an indication of the level of economic pain a nation is willing to accept to keep its military capacity. In this regard, Iraq outspends Kuwait and Saudi Arabia nearly 3 : 1.

Table 4

Defense Expenditure Comparisons

	Iraq	Kuwait/Saudi
Dollars Spent	\$12.816 Billion	\$24.501 Billion
% of GDP	57%	21%

Correlation of Expenditures

	Iraq	:	Kuwait/Saudi
Dollars Spent	1	:	1.9
% of GDP	2.7	:	1

1986

As was the case with the previous year, Iraq was still heavily involved with its war with Iran. The principle difference in this year was that the GDP of each of the countries declined appreciably, due to a drop in oil export revenues. Iraq suffered an 8% decrease, Kuwait a 7% drop, and Saudi Arabia's GDP declined nearly 9%.

Of the 3, Iraq was the most severely affected in terms of its percentage of GDP military expenditures. Table 5 shows only a slight decrease in dollars spent, 10%, but an increase of 8% of GDP spent on the military.

TABLE 5

IRAQ - 1986

GDP	-	\$17.65 Billion
DEFENSE EXPENDITURES	-	\$11.58 Billion
PERCENTAGE SPENT ON DEFENSE	-	65%

By comparison, Kuwait actually spent more in 1986 on defense than in 1985, \$1.42 vice \$1.4 billion. This slight Increase in defense spending added a single percentage point to its GDP military spending. Table 6 lists the particulars.

TABLE 6

Kuwait - 1986

GDP	-	\$17.56 Billion
DEFENSE EXPENDITURES	-	\$1.42 Billion
PERCENTAGE SPENT ON DEFENSE	-	8%

The Saudis' defense expenditures for the year seem to be the most practical based upon their military situation and the decline in oil revenues. Their defense

dollar expenditures reduced by nearly 1/2 and their percentage of GDP spending fell a full 3 points.

Table 7 depicts the Saudi outlays for the fiscal year 1986.

TABLE 7

Saudi Arabia - 1986

GDP	-	\$82.44 Billion
DEFENSE EXPENDITURES	-	\$11.30 Billion
PERCENTAGE OF GDP SPENT ON DEFENSE	-	21%

1986 was more typical of what you would expect when comparing a country whose armed forces were nearing the 3.5 million mark to 2 countries whose total forces were less than 400,000. Table 8 highlights the comparisons.

Table 8

Defense Expenditure Comparisons

	Iraq	Kuwait/Saudi
Dollars Spent	\$11.58 Billion	\$12.72 Billion
% of GDP	65%	15%

Correlation of Expenditures

	Iraq	:	Kuwait/Saudi
Dollars Spent	1	:	1.09
% of GDP	4.3	:	1

1987

Iraq was able to more than double its GDP in 1987. As such, its defense expenditures went up, while its economic pain level in terms of percentage of GDP was reduced considerably from 65% the previous year to 36%. Table 9 shows the expenditures for the year.

TABLE 9

Iraq - 1987

GDP	-	\$39.06 Billion
DEFENSE EXPENDITURES	-	\$13.99 Billion
PERCENTAGE OF GDP SPENT ON DEFENSE	-	36%

For Kuwait, a clear pattern seems to be emerging with relations to its percentages of GDP spent on the armed forces. It showed modest increases in its GDP but its military expenditures remain at the \$1.4 billion mark, 7% of its GDP spent on defense.

TABLE 10

Kuwait - 1987

GDP	-	\$19.5 Billion
DEFENSE EXPENDITURES	-	\$1.4 Billion
PERCENTAGE OF GDP SPENT ON DEFENSE	-	7%

No such pattern appears for the Saudis. While their GDP continued to decline, both defense spending and its percentage of GDP increased in 1987.

TABLE 11

Saudi Arabia - 1987

GDP	-	\$74.26 Billion
DEFENSE EXPENDITURES	-	\$16.24 Billion
PERCENTAGE OF GDP SPENT ON DEFENSE	-	22%

The comparison at Table 12 shows the continuing disparity between dollars expended and percentage of GDP allocated for defense. Iraq continues to be outspent by the Saudis and Kuwaitis but it is expending more than four times the proportion of its GDP on defense.

Table 12

Defense Expenditure Comparisons

	Iraq	Kuwait/Saudi
Dollars Spent	\$11.58 Billion	\$12.72 Billion
% of GDP	65%	15%

Correlation of Expenditures

	Iraq	:	Kuwait/Saudi
Dollars Spent	1	:	1.09
% of GDP	4.3	:	1

1988

The Iran - Iraq War formally ended in 1988. The Iraqis saw a continuing increase of their GDP during the year but only a slight drop in the dollar expenditures on the military. It was clear by this point that Saddam Hussien would continue to build and modernize his military forces to overcome Iraq's war losses. Table 13 depicts the data for Iraq in 1988.

TABLE 13

Iraq - 1988

GDP	-	\$45 Billion
DEFENSE EXPENDITURES	-	\$12.87 Billion
PERCENTAGE OF GDP SPENT ON DEFENSE	-	29%

The pattern continues to develop for Kuwait in 1988. While the year saw a healthy increase in GDP, there was only a slight increase in the dollar expenditures and the percentage of GDP allocated to defense remained at 7%.

TABLE 14

Kuwait - 1988

GDP	-	\$22.06 Billion
DEFENSE EXPENDITURES	-	\$1.47 Billion
PERCENTAGE OF GDP SPENT ON DEFENSE	-	7%

The Saudis continue to show little with regards to a pattern in their defense spending. Unlike the previous year, 1988 saw decreases in all 3 categories for the Saudis, GDP, dollars spent on defense and the proportion of GDP allocated to defense spending.

TABLE 15

Saudi Arabia - 1988

GDP	-	\$73.38 Billion
DEFENSE EXPENDITURES	-	\$13.57 Billion
PERCENTAGE OF GDP SPENT ON DEFENSE	-	18%

As the comparison table below shows, Iraq continues to be out spent by her southern neighbors but in 1988 the level of economic pain has been reduced dramatically for Iraq.

Table 16

Defense Expenditure Comparisons

	Iraq	Kuwait/Saudi
Dollars Spent	\$12.87 Billion	\$15.04 Billion
% of GDP	29%	16%

Correlation of Expenditures

	Iraq	:	Kuwait/Saudi
Dollars Spent	1	:	1.17
% of GDP	2.9	:	1

1989

One year after the war Iraq continues to build its armed forces which now number close to 4 million. Iraq's military is now ranked as the 4th largest in the world in terms of numbers of personnel and equipment. Clearly superior in these terms to any of its regional neighbors, Iraq seems on the verge of establishing itself as the regional hegemon. Recovering from the drudgery of the long war, Iraq's GDP has by now risen to a 5 year high. Its defense spending continues at fairly high levels although the proportion of the GDP committed to defense continues to decline.

TABLE 17

Iraq - 1989

GDP	-	\$58.54 Billion
DEFENSE EXPENDITURES	-	\$10.728 Billion
PERCENTAGE OF GDP SPENT ON DEFENSE	-	18%

The pattern for Kuwait now appears to be clear. There is once again growth in the GDP accompanied by a modest increase in dollar expenditure for defense. The percentage of defense spending of the GDP remains at the same 7% level.

TABLE 18

Kuwait - 1989

GDP	-	\$23.09 Billion
DEFENSE EXPENDITURES	-	\$1.54 Billion
PERCENTAGE OF GDP SPENT ON DEFENSE	-	7%

1989 saw at least the beginning of a trend for the Saudis. For the second year in a row all three of the variables increased, GDP, dollars spent on defense and the percentage of GDP committed to defense.

TABLE 19

Saudi Arabia - 1989

GDP	-	\$78.53 Billion
DEFENSE EXPENDITURES	-	\$14.69 Billion
PERCENTAGE OF GDP SPENT ON DEFENSE	-	19%

As with all previous years Kuwait and Saudi Arabia continue to outspend Iraq in terms of sheer dollar outlays for defense. Iraq continues to expend a greater proportion of its GDP on defense, although for the first time in the period covered by this study, Saudi Arabia has committed more of its GDP (19%) to defense spending than Iraq (18%)

Table 20

Defense Expenditure Comparisons

	Iraq	Kuwait/Saudi
Dollars Spent	\$10.728 Billion	\$14.69 Billion
% of GDP	18%	16%

Correlation of Expenditures

	Iraq	:	Kuwait/Saudi
Dollars Spent	1	:	1.52
% of GDP	1.13	:	1

1990

It appears by this time that Iraq's military build up is going to level off. Having built the 4th largest armed force in the world, Iraq spends fewer dollars than it has at any time since the beginning of the Iran - Iraq War 10 years earlier. Even with this drop in dollars expended, a falling GDP means an increase in this year's percentage of the GDP committed to defense.

TABLE 21

Iraq - 1990

GDP	-	\$40.78 Billion
DEFENSE EXPENDITURES	-	\$8.16 Billion
PERCENTAGE OF GDP SPENT ON DEFENSE	-	21%

1990 sees Kuwait's highest defense expenditure for the study period, albeit only marginally higher than its lowest mark. In terms of percentage of GDP it actually drops a point from 7% to 6% in what was to become the all important year for the Kuwaiti defense forces.

TABLE 22

Kuwait - 1990

GDP	-	\$25.31 Billion
DEFENSE EXPENDITURES	-	\$1.5 Billion
PERCENTAGE OF GDP SPENT ON DEFENSE	-	6%

Pattern analysis will still fail to with respect to the Saudis. In this year which will see the biggest threat in the history of the Kingdom, the GDP increases by 11%. Despite this, dollar expenditures drop nearly a billion from the previous year and the percentage of defense expenditure of the GDP drops 3%.

TABLE 23

Saudi Arabia - 1990

GDP	-	\$87.97 Billion
DEFENSE EXPENDITURES	-	\$13.86 Billion
PERCENTAGE OF GDP SPENT ON DEFENSE	-	16%

In this year which would put Iraq center stage in the eyes of the world, the nation with the 4th largest armed force was outspent almost 2 : 1 by 2 tiny, neighboring states. It is also evident from Table 24 that Iraq had begun to close the gap on the percentage of GDP allocated for defense with Kuwait and Saudi Arabia. Not something that would be expected of a nation about to become involved in another large scale war.

Table 24

Defense Expenditure Comparisons		
	Iraq	Kuwait/Saudi
Dollars Spent	\$8.6 Billion	\$15.36 Billion
% of GDP	21%	14%

Correlation of Expenditures		
	Iraq	: Kuwait/Saudi
Dollars Spent	1	: 1.9
% of GDP	1.5	: 1

Total Period

In the six year period from 1985 through 1990, a period which saw Iraq involved in a long armed conflict with one of its neighbors, Iraq were continued to build an armed force which the Iraqi leadership intended to use to insure its role as the hegemonic power in the region.

While one might not have expected that Kuwait and Saudi Arabia, would spend \$1.44 on defense for every \$1 Iraq invested. As Table 25 and 26 below clearly show, even though Iraq committed a much larger percentage of its GDP to defense than did Kuwait and Saudi Arabia, almost a 2 : 1 margin, Iraq was clearly outspent.

TABLE 25

SUMMARY OF EXPENDITURES
1985 - 1990

	<u>IRAQ</u>	<u>KUWAIT</u>	<u>SAUDI ARABIA</u>
TOTAL GDP	\$223.55 Bn	\$131.99 Bn	\$490.23 Bn
TOTAL DEFENSE EXPENDITURES	\$70.144 Bn	\$9,157 Bn	\$92.37 Bn
% OF GDP	31%	7%	19%

Table 26

Defense Expenditure Comparisons

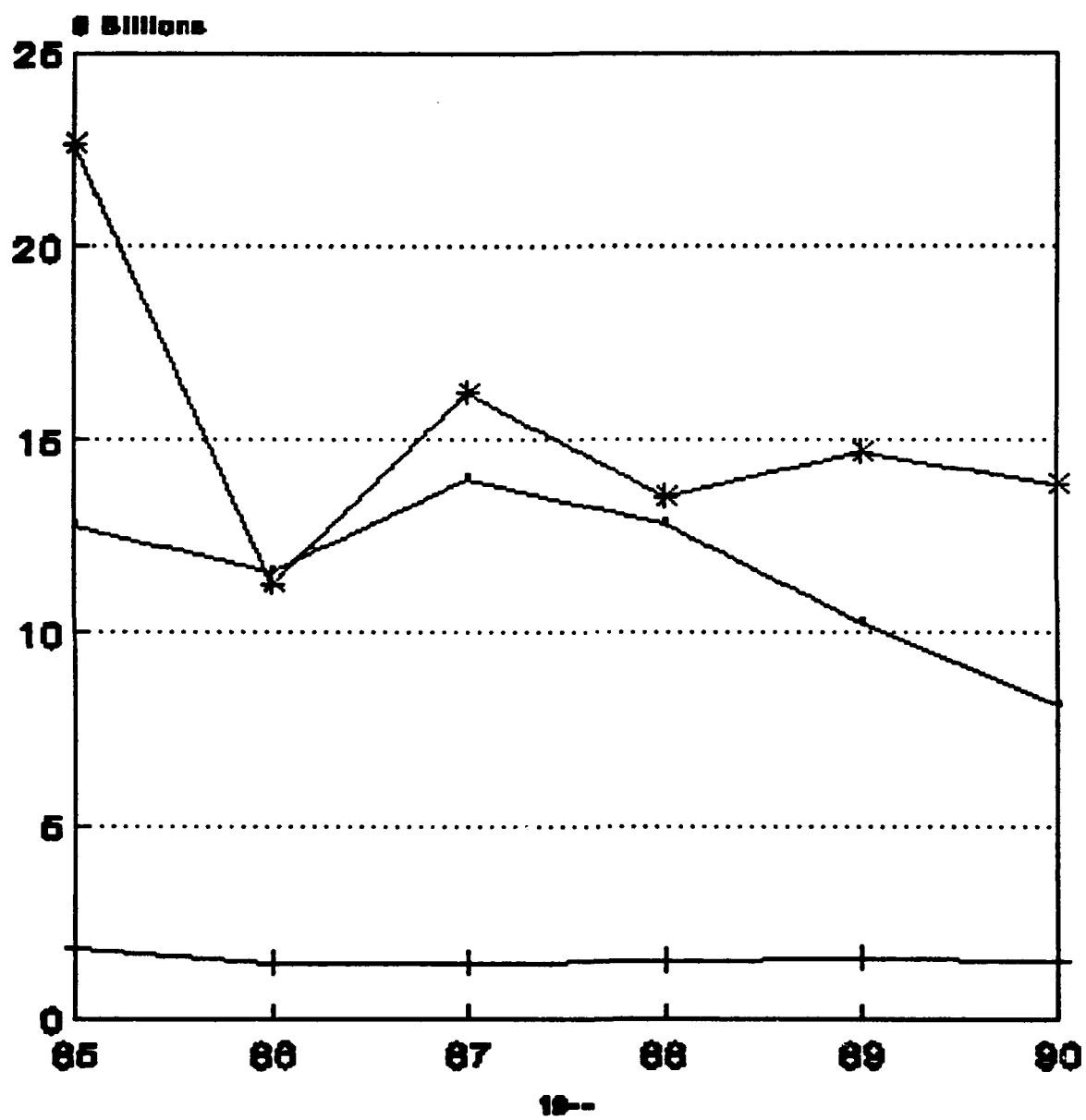
	Iraq	Kuwait/Saudi
Dollars Spent	\$70.144 Billion	\$101.527 Billion
% of GDP	31%	16%

Correlation of Expenditures

	Iraq	:	Kuwait/Saudi
Dollars Spent	1	:	1.44
% of GDP	1.93	:	1

As Figure 3 shows, only Kuwait showed any consistent pattern of defense spending.

Figure 3
Defense Spending Patters



— Iraq —+— Kuwait —*— Saudi Arabia

CHAPTER IV

"BEAN COUNTS"

The second most common type of analysis found in the literature is the type which makes a comparison between like weapons. This is a simple count of the number of like weapons in the inventories of military organizations. The normal groupings consist of tanks, infantry fighting vehicles (IFV), artillery, air defense artillery and surface to air missiles, anti-tank guns and missiles, attack helicopters and combat aircraft.

These counts reveal a raw number for each grouping of weapons and total of the various types of weapons found in a nation's inventory. This type of analysis is referred to as "bean counting". Bean counting can be useful in revealing general patterns and information on the size and types of military organizations a nation has equipped.

Unfortunately, bean counts are, more often than not, very misleading. The primary deficiency with bean counts is that they do not take into account the

differences, often significant differences, between "like" weapons. Bean counts consider all like weapons to be of equal value, (All tanks are created equal).

Another problem with this type of analysis is that it often leads to meaningless statistics. They often attempt to compare weapons which do not interact on the battlefield. A comparison of raw numbers of air defense or anti-tank weapons, for example, is a virtually meaningless exercise as these systems do not interact even indirectly, when used in the roles for which they were designed.

While it may be possible to track weapons procurements in terms of dollars spent and weapons received on a year to year basis, the level of effort required is far beyond the scope of this work. All of the data for this chapter has been extracted from the International Institute for Strategic Studies' Military Balance annuals for the years 1985 through 1991. Even using a single source there are often contradictions in the data. The classic example is with the Iraqis' Soviet built PT-76. The PT-76 is sometimes considered to be a tank and sometimes considered to be a reconnaissance vehicle. Depending upon which category the source uses, either the tank or IFV count will be off by as many as 150 units. Similar problems arise with the French built AMX-10 and the older American M-551.

Another problem with bean counts is that they simply do not capture the essence of the interaction of forces. Much has been made in the press recently concerning a House Armed Services Committee study entitled "Defense for A New Era: Lessons of the Persian Gulf War". One of the study's "lessons" deals with the correlation of forces in terms of personnel. Representative Les Aspin, (D - Wisconsin), the committee's chairman is quoted as follows:

What it says is that at the time of the ground war, when allied forces were roughly 700,000 people, the enemy could have been as low as 180,000 people, a very significant advantage.
(8)

If these numbers are correct, then the coalition forces enjoyed a theater wide advantage of 3.76 : 1 over the Iraqis in terms of personnel. The headline for the UPI newspaper article quotation above reads "Congress: Allies held 5 to 1 edge over Iraq". Leaving aside the 25% math error (5:1 vice 3.76:1), the bean count is virtually a meaningless number.

If Representative Aspin's committee were studying the wars of the Greek city states where large infantry formations (Phalanx) lined up opposite each other and fought with short swords, such a correlation could have some meaning. They could even be applicable to the situation the British mathematician and combat modeler Lanchester described as "Horatio at the bridge" when he developed his linear law for attrition in combat in 1914.

8. "Congress: Allies held 5-to-1 edge over Iraq", The Atlanta Journal-Constitution, 24 April 1992, pg. F3

Unfortunately, neither of those scenarios applies to modern warfare. Hopefully, the remainder of the House study, those portions to mundane to warrant even inaccurate press coverage, delve deeper into the lessons of modern combat.

Bean Count - 1985

As mentioned earlier, one of the few good qualities of bean counts is that they will at least give the researcher some idea as to proportion and a first cut at being able to identify serious discrepancies in force ratios. The remainder of this chapter looks at the force structures of Iraq, Kuwait and Saudi Arabia in terms of bean counts from 1985 through 1990. Tables and figures towards the end of the chapter will examine the bean count correlation of forces between the Iraqis and coalition forces as of 16 January 1991, the day combat began.

Table 27 shows that the overall bean count for the 1985 was 4.5 : 1 (Iraq : Kuwait/Saudi Arabia). While this fails the heuristic test (3 : 1), there are individual areas where the Kuwaitis and Saudis were below the 3 : 1 ratio and thus, relatively secure. Specifically, these were in infantry fighting vehicles (IFV) at 2.4 : 1 and anti-tank weapons at 2.8 : 1.

This table also reveals some woeful inadequacies. At first glance, the 17 : 1 correlation in terms of air

defense systems should draw immediate attention to this problem. Table 28, while still a bean count, reflects the actual situation more clearly by grouping weapons by their roles as opposed to simply counting like systems.

TABLE 27
BEAN COUNT - 1985

	IRAQ	KUWAIT/SAUDI ARABIA	COF
TANKS	2900	690	4.2 : 1
IFV	3000	1275	2.4 : 1
ARTILLERY	3543	488	7.3 : 1
ANTI-TANK	2500	904	2.8 : 1
AIR DEFENSE	4270	251	17 : 1
ATTACK HELICOPTERS	109	23	4.7 : 1
COMBAT AIRCRAFT	671	189	3.5 : 1
TOTAL	16,993	3,820	4.5 : 1

TABLE 28
BEAN COUNT - 1985
WEAPONS GROUPED BY FUNCTIONAL AREA

	IRAQ	KUWAIT/SAUDI ARABIA	COF
TANKS, AT ATK HELO	5509	1617	3.4 : 1
IFV	3000	1275	2.4 : 1
ARTILLERY	3543	488	7.3 : 1
AD / COMBAT AIRCRAFT	4941	440	11.2 : 1
TOTAL	16,993	3,820	4.5 : 1

By grouping the weapons, a more accurate picture begins to appear. The overall correlation remains the same at 4.5 : 1. However, the least favorable correlation is now 11.2 : 1, a 35% reduction and the correlation of forces dealing with the maneuver forces, tanks and IFV are 3.4 and 2.4 : 1 respectively.

BEAN COUNT - 1986

During this period the Iran - Iraq war was continuing to require the Iraqis to build their armed forces. Over the next few years we see a consistent increase across the board in the raw numbers of weapons Iraq acquired. While both the Kuwaitis and the Saudis increased their inventories, their increases were never as dramatic on a year to year basis. Table 29 shows the correlation of forces for 1986.

TABLE 29
BEAN COUNT - 1986

	IRAQ	KUWAIT/SAUDI ARABIA	COF
TANKS	4550	690	6.6 : 1
IFV	4000	1310	3.05: 1
ARTILLERY	5500	481	11.5 : 1
ANTI-TANK	2700	1004	2.7 : 1
AIR DEFENSE	4330	485	8.8 : 1
ATTACK HELICOPTERS	174	23	7.6 : 1
COMBAT AIRCRAFT	398	174	2.3 : 1
TOTAL	21,652	4,167	5.2 : 1

The 1985 -1986 time frame witnessed Iraq's largest expenditure, in terms of the percentage of its GDP, of the period studied, 57% and 65% respectively. It should not be surprising, then, to find large increases in the inventory. Iraq's biggest increase was in tube artillery, 2,000 tubes, followed by the acquisition of 1,000 Chinese Type 69 main battle tanks and 1,000 Soviet BMP infantry fighting vehicles. The drop of 73 combat aircraft is only partially attributed to war losses. 150 of these aircraft were old Soviet MiG-17s which were phased out of the inventory.

There were no significant increases on the Kuwaiti/Saudi side as the correlations in Tables 29 and 30 reflect. The Saudis did retire 15 of their older U.S. built F5s in this calendar year. Table 30 below groups the systems by function.

TABLE 30
BEAN COUNT - 1986
WEAPONS GROUPED BY FUNCTIONAL AREA

	IRAQ	KUWAIT/SAUDI ARABIA	COF
--	------	------------------------	-----

TANKS, AT ATK HELO	7424	1717	4.3 : 1
IFV	4000	1310	3.05 : 1
ARTILLERY	5500	481	11.4 : 1
AD / COMBAT AIRCRAFT	4728	659	7.1 : 1
TOTAL	21,652	4167	5.2 : 1

Even with the grouping by functional area Iraq has clearly put the Kuwaitis and Saudis further away from the acceptable 3 : 1 correlation. The overall COF has increased from 4.5 to 5.2 : 1 and the only area in which the two smaller states come close is the 3.05 : 1 COF in infantry fighting vehicles.

BEAN COUNT - 1987

The Iran - Iraq war had settled into its stalemate period by this year, and Iraq continued to build and modernized its armed forces. The most dramatic increases were in the acquisition of an additional 1,000 infantry fighting vehicles and 95 Chinese J-8 jet fighters. 1987 also saw increases in the Kuwaiti and Saudi armaments. Here, dramatic increases came in the form of

TABLE 31
BEAN COUNT - 1987

	IRAQ	KUWAIT/SAUDI ARABIA	COF
TANKS	4500	790	5.7 : 1
IFV	5000	1610	3.1 : 1
ARTILLERY	3050	567	5.4 : 1
ANTI-TANK	2700	1100	2.4 : 1
AIR DEFENSE	4330	914	4.7 : 1
ATTACK HELICOPTERS	186	23	8 : 1
COMBAT AIRCRAFT	500	173	2.9 : 1
TOTAL	20,266	5,177	3.9 : 1

100 U.S. built M60A3 main battle tanks and 80 155mm self-propelled artillery firing units. The overall COF is reduced from 5.2 : 1 in 1986 to 3.9 : 1 in 1987. Table 32 reflects the groupings by functional area. 1987 represents the closest Kuwait and Saudi Arabia get to meeting the 3 : 1 heuristic.

TABLE 32
BEAN COUNT - 1987
WEAPONS GROUPED BY FUNCTIONAL AREA

	IRAQ	KUWAIT/SAUDI ARABIA	COF
TANKS, AT ATK HELO	7386	1913	3.9 : 1
IFV	5000	1610	3.1 : 1
ARTILLERY	3050	567	5.4 : 1
AD / COMBAT AIRCRAFT	4830	1087	4.4 : 1
TOTAL	20,266	5177	3.9 : 1

BEAN COUNT - 1988

The year the Iran - Iraq war ends shows very little change in the data for Iraq. The only significant change is the reduction of combat aircraft from 500 to 444. This decrease is not explained in the source document and could be attributed to either war losses or the retirement of the aircraft. The most striking change on the Kuwaiti/Saudi side is the addition of 30 European built Toranado jet fighters and the retirement of 20% of Kuwait's older attack helicopters.

TABLE 33
BEAN COUNT - 1988

	IRAQ	KUWAIT/SAUDI ARABIA	COF
TANKS	4500	795	5.7 : 1
IFV	5000	1640	3 : 1
ARTILLERY	3050	599	5.1 : 1
ANTI-TANK	3100	1100	2.8 : 1
AIR DEFENSE	4330	976	4.4 : 1
ATTACK HELICOPTERS	186	18	10.3 : 1
COMBAT AIRCRAFT	444	191	2.3 : 1
TOTAL	20,610	5,319	3.9 : 1

The functional categories reflect the same general trend for 1988. Despite the equipment gains of Kuwait and Saudi Arabia, the overall correlation remains virtually unchanged.

TABLE 34
BEAN COUNT - 1988
WEAPONS GROUPED BY FUNCTIONAL AREA

	IRAQ	KUWAIT/SAUDI ARABIA	COF
TANKS, AT ATK HELO	7786	1913	4 : 1
IFV	5000	1640	3 : 1
ARTILLERY	3050	599	5.1 : 1
AD / COMBAT AIRCRAFT	4774	1167	4 : 1
TOTAL	20,610	5319	3.9 : 1

BEAN COUNT - 1989

Iraq, one year after the war, continues its modernization and build up. The acquisition of 1,000 Soviet T-72 main battle tanks, 91 advanced fighter aircraft (50 Soviet MiG-29s and 41 Chinese J-8s) and an additional 1,100 BMP infantry fighting vehicles highlight the building program.

For the Saudis and Kuwaitis 1989 brought only minor changes in the weapons inventories. The addition of 610 infantry fighting vehicles helped them keep pace with Iraq in this category, closing the COF from 3 to 2.7 : 1. However, the reduction of 135 pieces of tube artillery worsened that COF from 5 to 8.1 : 1.

TABLE 35
BEAN COUNT - 1989

	IRAQ	KUWAIT/SAUDI ARABIA	COF
TANKS	5500	795	6.9 : 1
IFV	6100	2250	2.7 : 1
ARTILLERY	3776	464	8.1 : 1
ANTI-TANK	3100	1150	2.8 : 1
AIR DEFENSE	4330	1096	3.9 : 1
ATTACK HELICOPTERS	186	18	10.3 : 1
COMBAT AIRCRAFT	535	181	2.9 : 1
TOTAL	23,527	5,945	4 : 1

The functional grouping tabular data gives a better representation of Iraq's gains for 1989. The small loss in the infantry fighting vehicle category is more than offset by gains in all other areas.

TABLE 36
BEAN COUNT - 1989
WEAPONS GROUPED BY FUNCTIONAL AREA

	IRAQ	KUWAIT/SAUDI ARABIA	COF
TANKS, AT ATK HELO	8786	1963	4.5 : 1
IFV	6100	2250	2.7 : 1
ARTILLERY	3776	464	8.1 : 1
AD / COMBAT AIRCRAFT	4865	1277	3.8 : 1
TOTAL	23,527	5945	4 : 1

BEAN COUNT - 1990

Iraq's lowest dollar output and least percentage of its GDP committed to defense expenditures was also the year which showed the smallest amount of growth in its forces. There were 2 areas with significant increases. 1,400 infantry fighting vehicles and 50 MiG-25 aircraft were added to Iraq's inventory.

While Iraq's rate of increase slowed, Kuwait and Saudi Arabia made significant increases in several areas in 1990. Of particular interest were the addition of 205 infantry fighting vehicles, 139 new 155mm and 203mm howitzers, 50 Toranado jet fighters and 18 F15 aircraft.

TABLE 37
BEAN COUNT - 1990

	IRAQ	KUWAIT/SAUDI ARABIA	COF
TANKS	5500	795	6.9 : 1
IFV	7500	2455	3 : 1
ARTILLERY	3786	603	6.3 : 1
ANTI-TANK	3258	1256	2.6 : 1
AIR DEFENSE	4680	1199	3.9 : 1
ATTACK HELICOPTERS	186	18	10.3 : 1
COMBAT AIRCRAFT	578	249	2.3 : 1
TOTAL	25,488	6,575	3.9 : 1

As Table 38 shows, Kuwait and Saudi Arabia were short of the 3 : 1 heuristic in all categories except IFVs at the time of Iraq's invasion. This, despite outspending Iraq over the 6 year period studied. Figures 4 and 5 graphically portray the proportion of weapons in the inventories at the start of the war.

TABLE 38
BEAN COUNT - 1990
WEAPONS GROUPED BY FUNCTIONAL AREA

	IRAQ	KUWAIT/SAUDI ARABIA	COF
TANKS, AT ATK HELO	8944	2069	4.3 : 1
IFV	7500	2455	3 : 1
ARTILLERY	3786	603	6.3 : 1
AD / COMBAT AIRCRAFT	5258	1448	4.6 : 1
TOTAL	25,488	6575	3.9 : 1

FIGURE 4
IRAQ WEAPONS - 1990

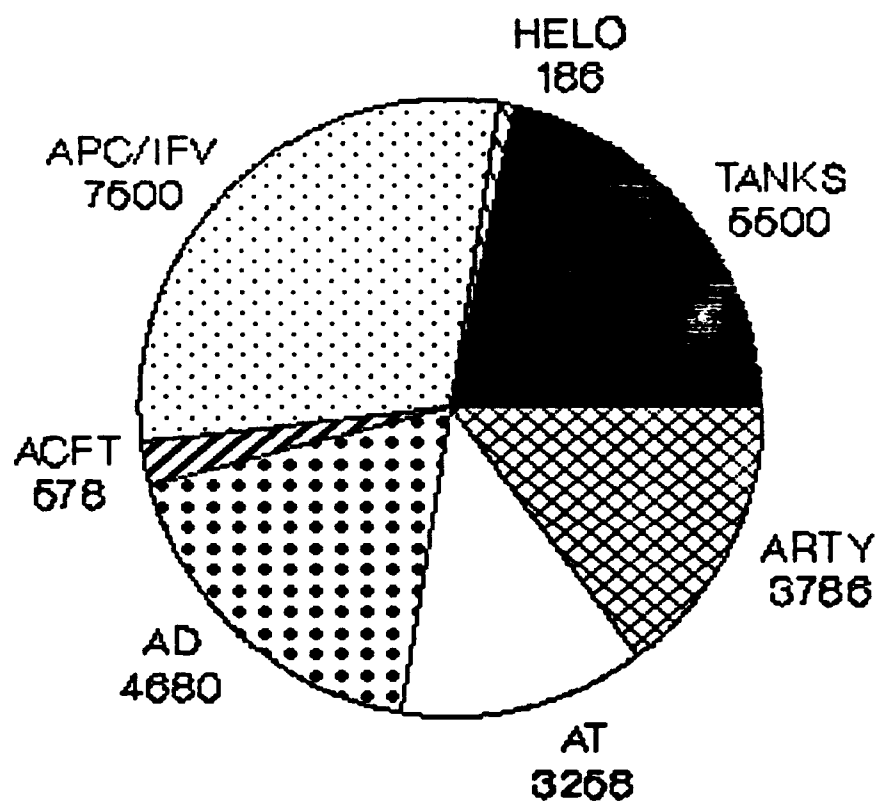
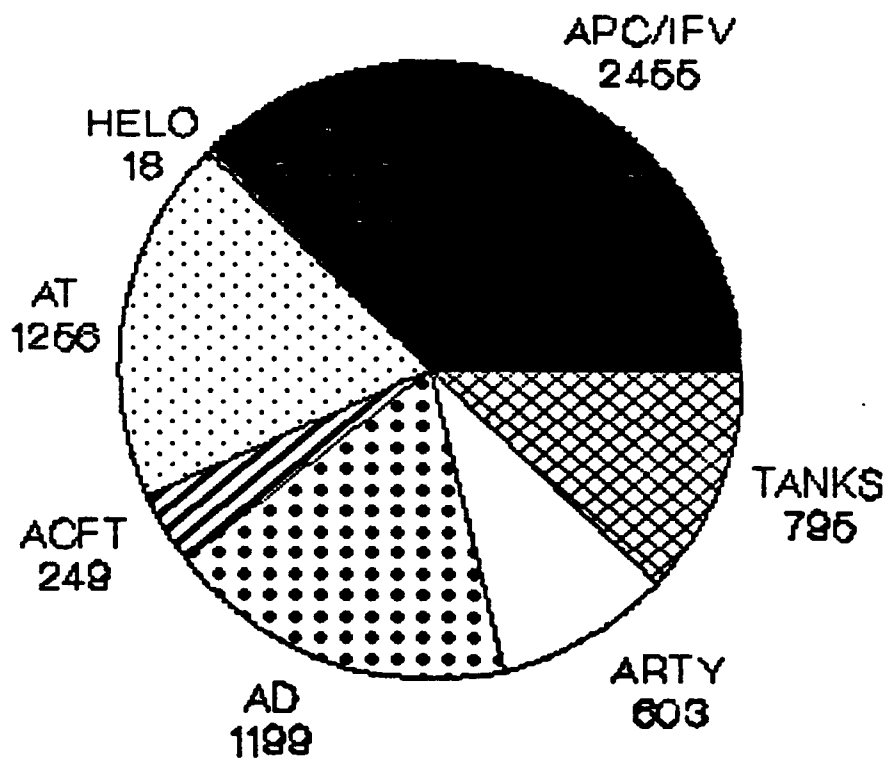


FIGURE 5
KUWAIT / SAUDI WEAPONS - 1990



Given the recent revelations in the press concerning the relative size of the coalition forces arrayed against Iraq on 16 January 1991, (see page 43), it is interesting to apply the information gathered from the International Institute of Strategic Studies 1990 - 1991 Military Balance to this chapter. The following table represents their assessment of the numbers of weapons available to the coalition forces (U.S., British, French, Saudi, Italian, Egyptian and Syrian) at the beginning of the Persian Gulf War.

Their tabular data reflects only the numbers of tanks, artillery tubes, attack helicopters and combat aircraft for the coalition. Anti-tank and air defense figures were drawn from the U.S. Army's RB 101-999, Staff Officer's Handbook and as such reflect only the doctrinal numbers of these weapons associated with a division's normal table of organization and equipment. Tables 39 and 40 reflect the correlation of forces in an Attacker : Defender ratio with the coalition forces as the attacker and the Iraqi forces as the defender.

As those tables reflect, Iraq was short of the 3 : 1 COF in only one category as of 16 January 1991, combat aircraft. The overall correlation was .9 : 1, considerably short of the 5 : 1 COF implied in the press account of the congressional study.

TABLE 39
BEAN COUNT - 1990

	COALITION	IRAQ	COF
TANKS	3687	5500	.67 : 1
IFV	5872	7500	.78 : 1
ARTILLERY	2711	3786	.72 : 1
ANTI-TANK	6390	3258	2 : 1
AIR DEFENSE	1933	4680	.41 : 1
ATTACK HELICOPTERS	526	186	2.8 : 1
COMBAT AIRCRAFT	1813	578	3.14 : 1
TOTAL	22,932	25,488	.9 : 1

As Table 39 shows, the Iraqis were clearly short of the 3 : 1 heuristic in only one category, combat aircraft. The overall correlation is .9 : 1.

TABLE 40
BEAN COUNT - 1990
WEAPONS GROUPED BY FUNCTIONAL AREA

	COALITION	IRAQ	COF
TANKS, AT ATK HELO	10603	8944	1.2 : 1
IFV	5872	7500	.78 : 1
ARTILLERY	2711	3786	.72 : 1
AD / COMBAT AIRCRAFT	3746	5258	.71 : 1
TOTAL	22,932	25,488	.9 : 1

Chapter V

COMBAT POTENTIAL

The next level of analysis addresses the question of defensive sufficiency in terms of combat potential. This is a refinement of the simple bean count. The definition of combat potential from Chapter 2 is reproduced below for the reader's convenience.

Combat Potential: A measure of combat power of a force or group of forces that is adjusted for the type and quality of its weapons. These adjustment take into account the various technical aspects inherent to the weapon and reflect its relative weight under generalized combat conditions. The combat potential of a unit is the sum of the combat potential of its weapons. In effect, a heterogeneous force is given a homogeneous character in terms of its combat potential. The technical aspects inherent to a weapon are known as Standard Units of Armament (SUA) or Weapons Equivalent Weighted Values (WEWV). The adjustment of raw numbers of weapons (bean counts) into combat potential scores reflects the fact that all weapons of a similar type do not have the same technical characteristics or capabilities.

This level of analysis is usually associated with efforts to simulate or model combat. Every model which includes two sided attrition has used some form of combat potential measurement since the early 1900s. This early approach to attrition modeling dealt only with direct fire weapons. The assumption being that the individual or crew operating the weapon was using it as it was intended to be used and that they could visually acquire their target. Further developments in attrition modeling dealt with indirect fire weapons.

To reinforce the point that bean counting is an inefficient method of determining combat power, Table 41 looks at three tanks which were prominent, at least in numbers, on the battlefield during the Gulf War. Bean counts would weigh each of these tanks as being of the same value.

TABLE 41
SIMILAR BUT NOT EQUAL

	M1A1	T-72	T-55
Weight (metric tons)	65	41	36
Speed (Kph)	80	60	50
Height (meters)	3.8	2.3	2.3
Main Gun (mm)	120	125	100
Rate of Fire (rounds/min)	6-8	6-8	5-7
Max Effective Range (m)	4,000	3,500	3000

SOURCE: FM 100-2-3

To translate the raw numbers of weapons (bean counts) into combat potential scores, each individual category of weapon is multiplied by its associated standard unit of armament score. The Standard Units of Armament (SUA) used for this study are unclassified. They were developed for the U.S. Army by Science Applications International Corporation, Greenwood Village, Colorado. A complete listing of the SUAs is presented in Appendix 1.

TABLE 42
WEAPONS AVAILABLE 01 AUGUST 1990
KUWAIT & SAUDI ARABIA

FORCE STRUCTURE

GROUND FORCES

4 Armored Brigades
6 Mech Infantry Brigades
1 Airborne Brigade
12 Arty Battalions

AIR FORCES

2 Ground Attack Sqdns
11 Fighter Sqdns
5 Atk Helo Sqdns
64 Air Def Battalions

Major Weapons Systems

Tanks - 795

300 X AMX-30
165 X Centurians
70 X Chieftans
70 X Vickers
150 X M1A1
40 X M60A3

Artillery - 603 Tubes (107mm >)

60 X 155 Towed
275 X 155 SP
250 X 204 SP
6 X 127 MRL
12 X FROG-7

APC/IFV - 2455

1675 X M113
200 X AML-60
350 X AMX-10
100 X Saladin
130 X Sacren

Anti-Tank - 1256

400 x TOW
256 x I-TOW
600 x DRAGON

Combat Aircraft - 267

24 X A-10
83 X F5
78 X F15
32 X Mirage 2000
32 X Toranado
18 X Attack Helo

Air Defense - 1199

164 X I-HAWK
12 X SA-8
18 X SA-6
68 X Croatale
440 X Stinger
497 X SA-7

TABLE 43
WEAPONS AVAILABLE 01 AUGUST 1990
IRAQ

FORCE STRUCTURE

GROUND FORCES

4 Regional Commands
7 Army Headquarters
16 Corps Headquarters
4 Armored Divisions
6 Mech Infantry Divisions
39 Infantry Divisions
20 Separate Brigades

Major Weapons Systems

TANKS - 5500

3750 X (T54/55/62/72)
1500 X (T55/69 Chinese)
150 X M60 (Romanian)
100 X PT-76
APC/IFV - 7500
6000 X BMP
1500 X (BTR50/60/70)
ARTILLERY - 3786 (120MM >)
1500 X Towed (122,130,152mm)
1625 X SP (122,152,155,203mm)
200 X MRL (122,140mm)
411 X MORTAR (120mm)
30 X FROG-7
20 X SCUD-B

ANTI-TANK - 3258

706 X AT3
800 X AT-4
600 X T-12
1000 X RPG-9
152 X T-85

AIR FORCES

4 Bomber Sqdns
25 Fighter Sqdns
2 Ground Atk Sqdn
10 ATK Helo Sqdns

COMBAT AIRCRAFT - 764

8 X TU-22 8 X TU-16
70 X MiG-23
94 X MIRAGE
48 X MiG-29
24 X Su-20
16 X Su-25
160 X MiG-25
150 X MiG-21
186 ATTACK HELO

AIR DEFENSE - 4680

3000 x (23,23-4,57mm)
1310 X (SA9,11,14)
120 X SA-2
150 X SA-3

The conversion from bean counts to combat potential is the multiplication of the individual weapons systems by their associated SUA values. Appendix 2 contains this conversion process. Table 44 on the following page shows the Iraqi combat potential.

TABLE 44
IRAQI COMBAT POTENTIAL

<u>WEAPON</u>	<u>COMBAT POTENTIAL</u>
TANKS	7005.00
APC/IFV	6800.00
ARTILLERY	3654.04
ANTI-TANK	1049.80
AIR DEFENSE	1206.00
ATTACK HELICOPTERS	259.40
COMBAT AIRCRAFT	<u>3645.00</u>
TOTAL COMBAT POTENTIAL	23,619.24

There is a considerable difference between the combat potential and bean count figures. The CP score for tanks is 1,505 higher than the bean count. For APC/IFV the difference is a decrease of 700. Artillery shows a decrease from the bean count figure of 131.96. Anti-Tank combat potential shows a decrease of 2,208.2 and Air Defense drops 3,474. The combat potential figures for attack helicopters and combat aircraft increase 73.4 and 3,067 respectively.

Table 45 below provides the same information for the Kuwait/Saudi coalition. The resulting correlation of forces in terms of combat potential are summarized in Table 46.

TABLE 45
KUWAIT/SAUDI COMBAT POTENTIAL

<u>WEAPON</u>	<u>COMBAT POTENTIAL</u>
TANKS	1312.50
APC/IFV	1409.00
ARTILLERY	789.80
ANTI-TANK	537.60
AIR DEFENSE	375.10
ATTACK HELICOPTERS	27.00
COMBAT AIRCRAFT	<u>2483.00</u>
TOTAL COMBAT POTENTIAL	6,934.00

As was the case with the Iraqis, there are considerable differences between the Kuwaiti/Saudi bean counts and their combat potential scores. Tanks increased by 517.5, artillery by 186.8. APC/IFVs, Anti-tank and Air Defense decreased by 1,046, 718.4 and 823.9 respectively. Attack helicopters rose by 9 and combat aircraft by 2,216.

TABLE 46
COF BY COMBAT POTENTIAL

<u>IRAQ</u>	<u>COF</u>	<u>KUWAIT/SAUDI</u>
TANKS - 7005	5.34 : 1	1312.5 - TANKS
APC/IFV - 6800	4.83 : 1	1409 - APC/IFV
ARTY - 3654.04	4.63 : 1	789.8 - ARTY
AT - 1049.8	1.95 : 1	537.6 - AT
AD - 1206	3.22 : 1	375.1 - AD
ATK HELO - 259.4	9.61 : 1	27 - ATK HELO
CBT ACFT - 3645	1.47 : 1	2483 - CBT ACFT
TOTAL CP - 23619.24	3.41 : 1	6934 - TOTAL CP

Grouping the weapons by functional category reveals the following COF in terms of combat potential.

TABLE 47
COF BY FUNCTIONAL AREA

<u>IRAQ</u>	<u>COF</u>	<u>KUWAIT/SAUDI</u>
TANKS/AT ATK HELO - 8314.2	4.43 : 1	TANKS/AT 1877.1 - ATK HELO
APC/IFV - 6800	4.83 : 1	1409 - APC/IFV
ARTY - 3654.04	4.63 : 1	789.8 - ARTY
AIR DEF/ CBT ACFT - 4851	1.70 : 1	AIR DEF/ 2858.1 - CBT ACFT
TOTAL CP - 23619.24	3.41 : 1	6934 - TOTAL CP

Comparisons between the bean counts and combat potential scores are shown in Chapter 7, "Conclusions". For now, it is only required to examine the difference

between the correlations in Tables 46 and 47. While the overall correlation remains the same (3.41 : 1) no other correlation is worse than 4.83 : 1 in the grouped table. In the straight correlation, the worst correlations are in tanks (5.34 : 1) and attack helicopters (9.61 : 1). Figures 6 and 7 on the following pages show the proportion of weapons for each country based on their combat potential.

While the Kuwaitis and Saudis are not at the 3 : 1 threshold in 5 of the 8 categories listed in Tables 46 and 47, they do not appear to be as far away as with simple bean counts. In the individual weapons categories, they are short the following percentages: Tanks - 44%, APC/IFV - 38%, Artillery - 35%, Air Defense - 7%, Attack Helicopters - 69% and in the overall correlation 12%. They are in excess of the heuristic requirement by 35% in terms of anti-tank combat potential and by 51% in terms of combat aircraft CP.

These figures are less imposing for the grouped data. In those categories the Kuwaitis and Saudis were short 22% of the required tanks, anti-tank weapons and attack helicopters. The artillery and APC/IFV correlations remained the same, as did the overall correlation. In air defense and combat aircraft combat potential the Kuwaitis and Saudis were in excess of their requirement by 43%.

FIGURE 6
IRAQI COMBAT POTENTIAL

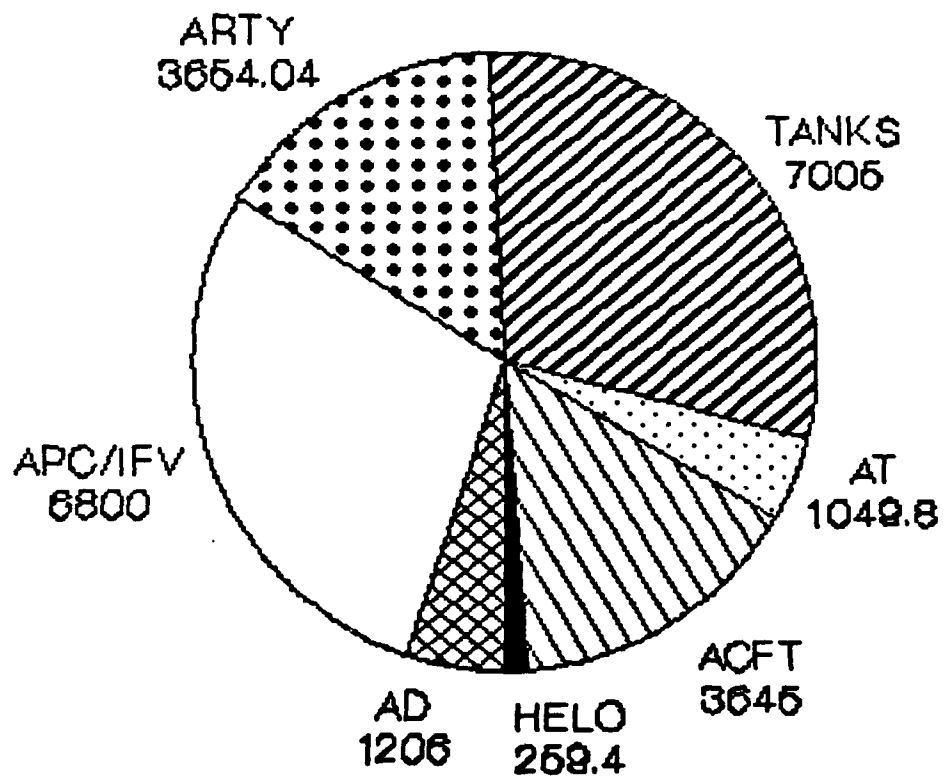
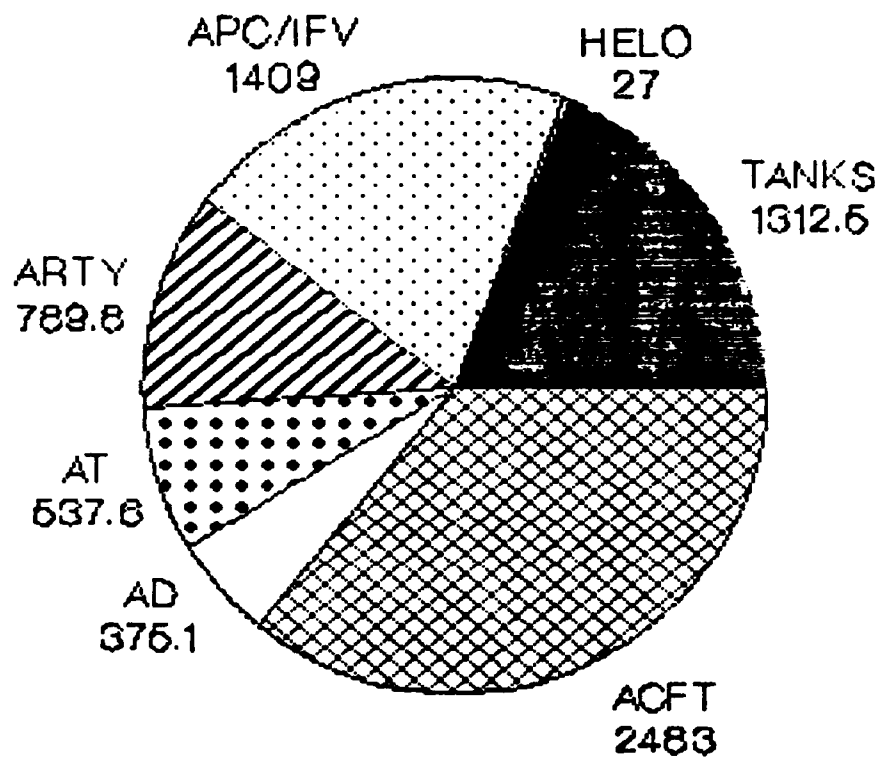


FIGURE 7
KUWAIT / SAUDI COMBAT POTENTIAL



What this type of analysis shows is that the Kuwait/Saudi group has a clear advantage in terms of its combat potential in combat aircraft. By reducing the Air Defense/Combat Aircraft combat potential by 866 units of combat potential in combat aircraft, this still leaves a 3 : 1 COF in this category. Those 866 units of combat potential may then be applied elsewhere to bring other lopsided correlations more into alignment.

In this case, if the 866 excess units of combat potential were split evenly between an anti-tank and artillery role then the resulting correlation of forces in those areas would be reduced to 3.6 : 1 and 2.98 : 1 respectively. This type of procedure is not inherently obvious in a bean count analysis. The ability to focus on the total force as a homogeneous entity rather than a heterogeneous one allows planners to provide a better force mix in terms of the 3 : 1 heuristic.

Using this homogeneous combat potential type of analysis, it should be possible to "predict" the force requirement in terms of the heuristic in a much more meaningful way than with a simple bean count. An example of this type of prediction is provided in the following pages using linear regression. In this case, the projected value of "y", the dependent variable or

predicted (required) level of combat potential needed by the Kuwaitis and Saudis to reach the 3 : 1 correlation, is equal to the intercept of the "y" axis, plus the Beta or slope times the independent variable "x", the combat potential for Iraq for any given category of weapons.

The known quantities are Iraq's combat potential scores by weapons type and Kuwait/Saudi combat potential by weapons types. The regression procedure is outlined in Appendix 3. While this analysis is restricted to the countries selected for this study, a similar analysis could be performed for any country or combination of countries, given that the order of battle information was available. This simple model named, for want of a better title, "Arms Sales Threat Assessment" or ASTA could be used by anyone interested in determining combat potential requirements for any given regional balance of power arrangement.

Figure 8 on the following page shows the results of the regression analysis. Figure 9 represents the same data in the form of a histogram which provides an even clearer picture of the amount of combat potential available and required to meet the 3 : 1 heuristic.

Figure 8
ASTA

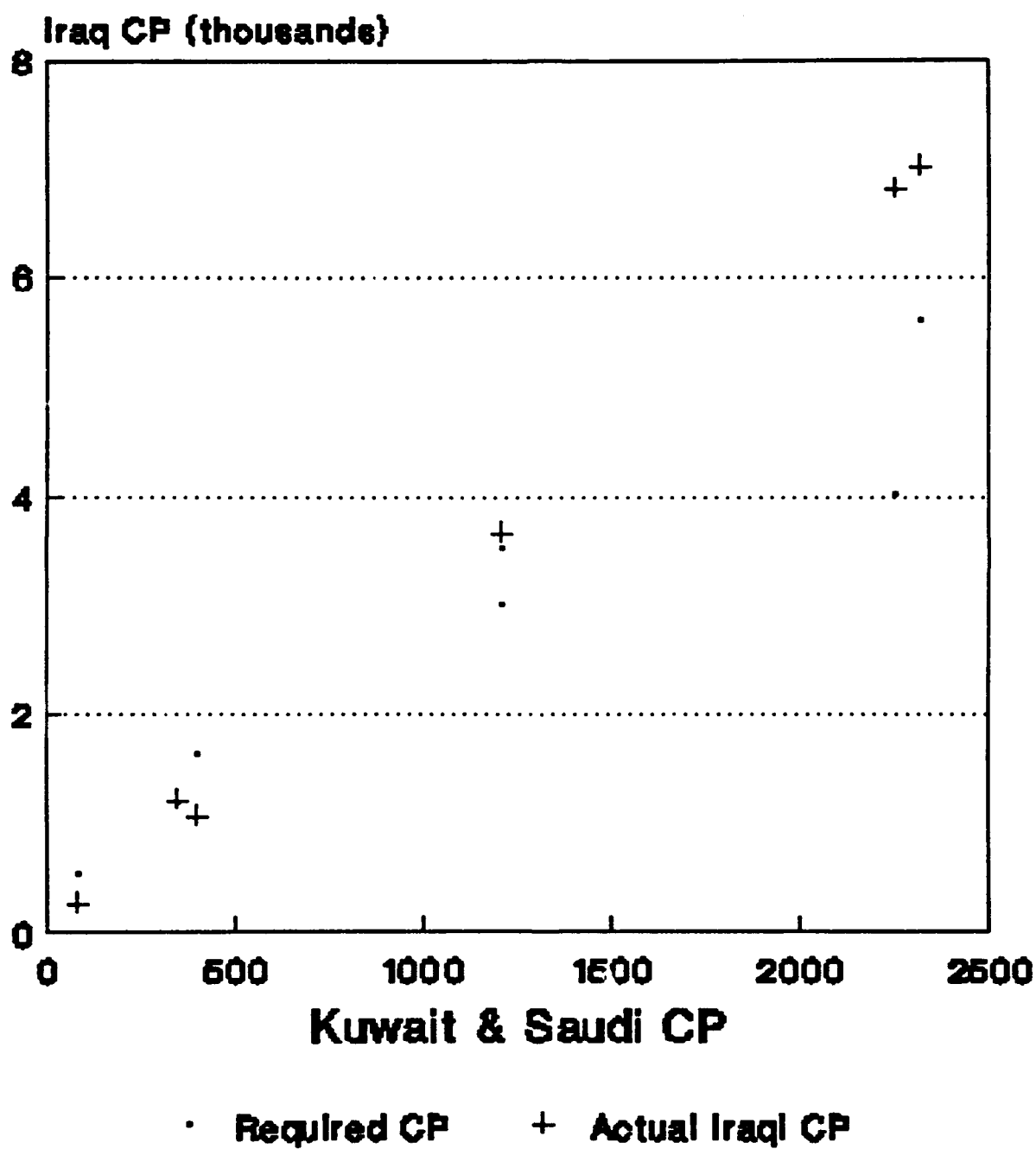
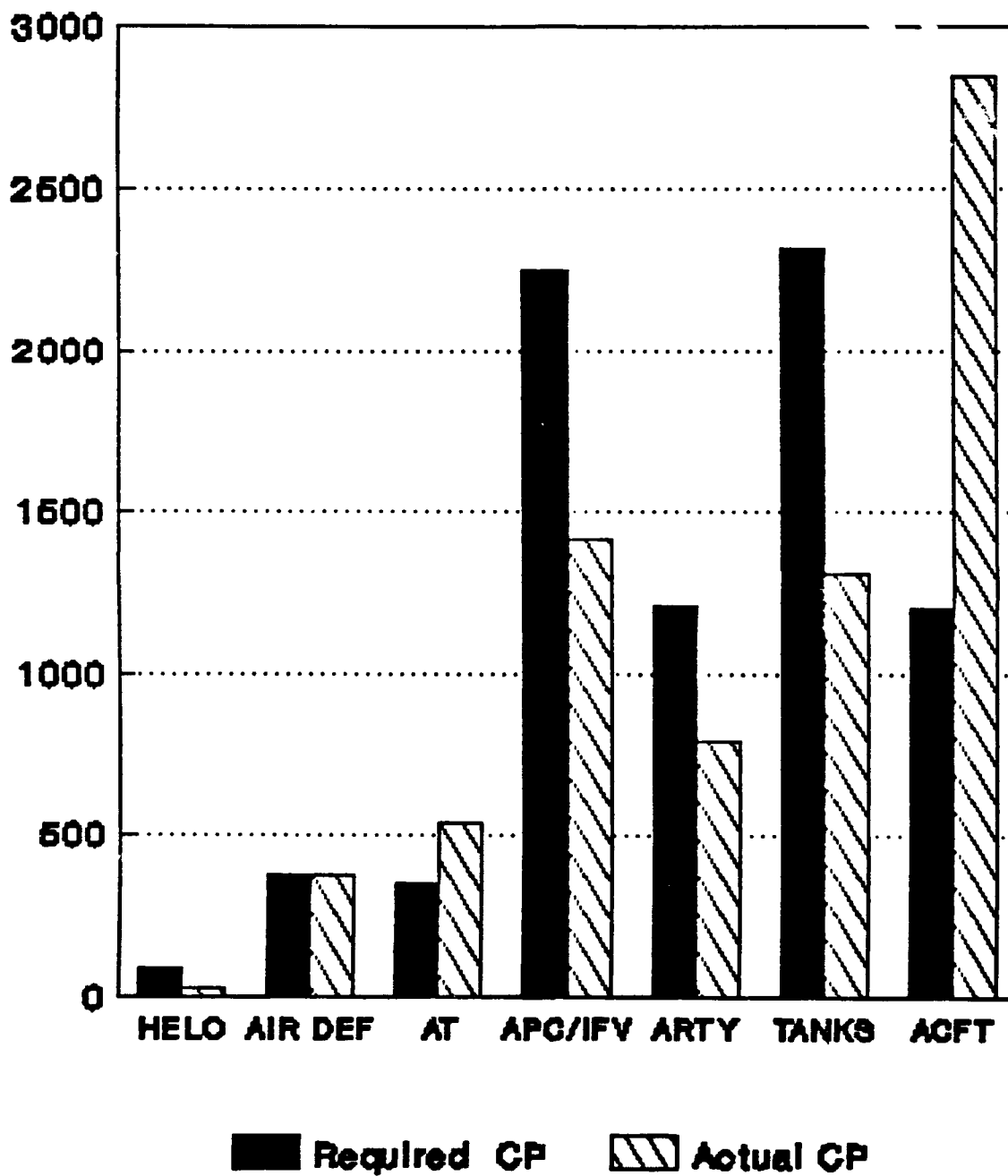


FIGURE 9
COMBAT POTENTIAL REQUIRED



Just as at the end of the previous chapter we looked at the bean count correlations for the coalition forces arrayed against Iraq at the beginning of the Gulf War, here, we will examine those correlations in terms of combat potential. Table 48 lists the numbers and types of weapons available to the coalition forces as of 16 January 1991.

TABLE 48
Weapons Available 16 January 1991
Coalition Forces

Major Weapons Systems

Tanks - 3687

1702 X M1A1
708 X M60A3
327 X Chieftans
200 X AMX-30
450 X T-62
300 X T-72

Artillery - 2711 Tubes (107mm >)

60 X 155 Towed
1268 X 155 SP
1169 X 204 SP
50 X MLRS
94 X 2S3
70 X 2S1

APC/IFV - 5872

1000 X M113
200 X AML-60
4092 X Bradley
350 X AMX-10
100 X Saladin
130 X Sacren

Anti-Tank - 6390

2900 x TOW
256 x I-TOW
3234 x DRAGON

Combat Aircraft - 2339

164 X A-10
83 X F5
208 X F15
163 X Mirage 2000
204 X Toranado
526 X Attack Helo
249 X F16

80 X F111
44 X F117
276 X F18
244 X F14
80 X A6
18 X B52

Air Defense - 1933

497 X SA-7
360 X Chaparrel
360 X Vulcan
154 X I-HAWK
68 X Croatale
464 X Stinger
12 X SA-8
18 X SA-6

Table 49 represents the COF in terms of combat potential at the start of the Gulf War.

TABLE 49
COF BY COMBAT POTENTIAL

<u>Coalition</u>	<u>COF</u>	<u>Iraq</u>
TANKS - 6536.2	.93 : 1	7005 - TANKS
APC/IFV - 7097	1.04 : 1	6800 - APC/IFV
ARTY - 3748.5	1.03 : 1	3654.04 - ARTY
AT - 2314.4	2.20 : 1	1049.8 - AT
AD - 625.3	.52 : 1	1206 - AD
ATK HELO - 1004.4	3.87 : 1	259.4 - ATK HELO
CBT ACFT - 20,369.5	5.59 : 1	3645 - CBT ACFT
TOTAL CP - 41695.5	1.76 : 1	23619.24 - TOTAL CP

Grouping the weapons by functional category, Table 50 reveals the following COF in terms of combat potential.

TABLE 50
COF BY FUNCTIONAL AREA

<u>Coalition</u>	<u>COF</u>	<u>Iraq</u>
TANKS/AT ATK HELO - 9855	1.18 : 1	TANKS/AT 8314.2 - ATK HELO
APC/IFV - 7097	1.04 : 1	6800 - APC/IFV
ARTY - 3748.54	1.03 : 1	3654.09 - ARTY
AIR DEF/ CBT ACFT - 20994.8	4.33 : 1	AIR DEF/ 4851 - CBT ACFT
TOTAL CP - 41695.5	1.76 : 1	23619.24 - TOTAL CP

CHAPTER VI

COMBAT CAPABILITY

This final level of analysis addresses the question of defensive sufficiency in terms of combat capability. This is a refinement of both the bean count and the combat potential analysis. The operational definition of combat capability from Chapter 2 is reproduced below for the reader's convenience.

Combat Capability: This is another measure of combat power. The combat capability of a unit is determined through the use of various adjustment factors applied to its combat potential score through multiplication. The adjustment factors include, individual training, unit level training, maneuver, sustainment, command and control, fire support, intelligence, air defense, maintenance and finally, engineering support. The combat capability assessment is used to translate a unit's combat potential measure into a qualitative measure which better captures the essence of combat.

While all U.S. military forces apply some type of combat capability analysis to their own forces, this

process is not universally applied to armed forces of other nations. There is no systemic, institutionalized, application of this process in terms of simultaneous forecasting or net assessment done at the operational level. U.S. Army units prepare monthly Unit Status reports from battalion through Army level, similar reports, Operational Readiness Reports are prepared by Navy and Air Force units.

The armed forces of the former Soviet Union had operationalized this procedure. It was used extensively throughout all echelons of command from regiment through front. It should not be surprising that the armed forces of a nation steeped in the tenants of the dialectic, with a stated requirement to "scientifically substantiate" all of its decisions, would adopt such methods at the operational level. (9)

To determine the combat capability of the armed forces of the nations examined in this thesis, an expert panel was surveyed through the use of a mailed, open and closed ended questionnaire. The expert panel consisted of field grade officers (Major. Lieutenant Colonel and Colonel) in the U.S. Army, Air Force and Navy

9. For an excellent description of this process, see James G. Taylor's Initial Examination of Cybernetic Concepts in Soviet Military Affairs (Naval Postgraduate School, Monterey, CA., December 1985) and Initial Examination of Soviet Concepts for the Control of Military Systems, (Naval Postgraduate School, Monterey, CA., September, 1986)

(Lieutenant Commander, Commander and Captain). The demographics for this group of experts is provided in Appendix 4.

The responses from the expert panel are provided in Appendix 5. This data takes the form of the mean score for each of the variables and the variance and standard deviation for each variable. The questionnaire, which contains the operationalized definitions for each variable, is provided in Appendix 6.

For each of the 10 variables the expert panel was asked to rank the capability of the Iraqi, Kuwaiti and Saudi Arabian, and coalition armed forces. The rating scale is from 0.00 to 1.00. A score of 0.00 represents absolutely no capability to apply this combat multiplier. A score of 1.00 represents a perfect capability. The assumption is that no force structure is either completely incapable of applying these combat multipliers or perfectly capable of applying them at all times.

To determine a force structures combat capability, the means for each variable are summed and then divided by the number of variables. The resulting fraction becomes the combat capability adjustment factor. This number is then multiplied by the combat potential scores for the various types of weapons and the total combat potential score. The resulting score represents a numerical expression of that total force structure's combat capability.

Just as the ASTA model was used to predict the combat potential requirements of a given force, the process of converting combat potential into combat capability becomes a model of a different sort. Here, the capability of a military force is "modeled" through the multiplication of its combat potential by its combat capability adjustment factors. The intent is to predict the relative combat power of opposing forces in terms of their capability to function as they are intended. For want of a better title, this model is called the "Predictive Intelligence Model", or PIE.

The principle difference between combat potential scores and combat capability scores is that the former deals only with the technical characteristics of the weapons. Combat capability scores represent the difference between weapons and weapons systems. A weapons system is a weapon which is operated by people and the multitude of support systems (concepts, hardware and training) which make the weapons function as they were intended.

Combat Capability - Iraq

Table 51 below lists the combat capability adjustment factors for Iraq. Iraq's overall combat capability adjustment factor is .434.

TABLE 51

Combat Capability Adjustment Factors - Iraq

	<u>Mean</u>	<u>Variance</u>	<u>Standard Deviation</u>
Maneuver	.47	.03	.17
Sustainment	.54	.02	.15
Unit Level Training	.48	.04	.20
Fire Support	.51	.04	.20
Engineer Support	.55	.04	.21
Intelligence	.29	.01	.10
Maintenance	.38	.03	.16
Command and Control	.43	.03	.17
Air Defense	.41	.01	.10
Individual Training	.28	.01	.11

Iraq's highest combat capability adjustment factors were in the support arenas of logistics, (sustainment) and engineer support .54 and .55 respectively. The only other score which broke the .5 line was fire support at .51. Iraq's lowest score, .29, was for its intelligence function (military intelligence). The overall combat capability adjustment factor of .434 means that Iraq's combat potential will be reduced by 57% when the combat capability variables are considered. Table 52 displays Iraq's combat capability.

Table 52

Combat Capability - Iraq

	Combat	Combat Capability	Combat
	<u>Potential</u> X	<u>Adjustment Factor</u>	= <u>Capability</u>
Tanks	7005.00	.434	3040.17
APC/IFV	6800.00	.434	2951.20
Artillery	3654.04	.434	1585.85
Anti-Tank	1049.80	.434	451.61
Air Defense	1206.00	.434	523.40
Atk Helo	259.40	.434	112.57
Cbt Acft	<u>3645.00</u>	.434	<u>1581.93</u>
Combat		Combat	
Potential =	23,619.24	Capability =	10,250.75

Combat Capability - Kuwait and Saudi Arabia

Table 53 lists the combat capability adjustment factors for Kuwait and Saudi Arabia. Their overall combat capability adjustment factor was .402

Kuwait and Saudi Arabia had only one category above the .5 line, Command and Control at .51. They were below the Iraqis in 6 of the 10 categories and above them in 4. The largest differences on the minus side were in fire support, .37 vice .51 and engineering, .34 vice .55. The largest difference on the plus side was in individual training, .44 to .28.

TABLE 53

Combat Capability Adjustment Factors - Kuwait/Saudi

	<u>Mean</u>	<u>Variance</u>	<u>Standard Deviation</u>
Maneuver	.39	.02	.12
Sustainment	.42	.03	.18
Unit Level Training	.36	.01	.11
Fire Support	.37	.02	.13
Engineer Support	.34	.02	.14
Intelligence	.40	.02	.14
Maintenance	.43	.02	.16
Command and Control	.51	.02	.15
Air Defense	.36	.02	.14
Individual Training	.44	.03	.18

Table 54

Combat Capability - Kuwait / Saudi

	<u>Combat Potential</u>	<u>Combat Capability Adjustment Factor</u>	<u>Combat Capability</u>
	X	=	
Tanks	1312.50	.402	527.62
APC/IFV	1409.00	.402	566.41
Artillery	789.80	.402	317.49
Anti-Tank	537.60	.402	216.11
Air Defense	375.10	.402	150.79
Atk Helo	27.00	.402	10.85
Cbt Acft	<u>2483.00</u>	.402	<u>998.16</u>
Combat		Combat	
Potential =	6,934.00	Capability =	2,787.46

Table 55 shows the comparison by combat multiplier of the Iraqi and Kuwaiti/Saudi forces. The overall difference, in terms of combat capability is 7%. Table 56 shows the correlation of forces in terms of combat capability. The 7% difference also carries over into categorical and total correlation of force calculations. The resultant effect is that the Kuwait/Saudi coalition is pushed further away from meeting the requirements of the 3 : 1 heuristic.

TABLE 55

Combat Capability Factor

Comparison

	<u>Iraq</u>	<u>Kuwait/Saudi</u>	<u>Difference</u>
Maneuver	.47	.39	(-) .12
Sustainment	.54	.42	(-) .12
Unit Level Training	.48	.36	(-) .12
Fire Support	.51	.37	(-) .14
Engineer Support	.55	.34	(-) .21
Intelligence	.29	.40	(+) .11
Maintenance	.38	.43	(+) .05
Command and Control	.43	.51	(+) .08
Air Defense	.41	.36	(-) .05
Individual Training	.28	.44	(+) .16

TABLE 56

Correlation of Forces - Combat Capability

	Iraq	COF	Kuwait/Saudi	
Tanks	3040.17	5.76 : 1	527.62	Tanks
APC/IFV	2951.20	5.21 : 1	566.41	APC/IFV
Arty	1585.85	4.99 : 1	317.49	Arty
AT	455.61	2.10 : 1	216.11	AT
AD	523.40	3.47 : 1	150.79	AD
Helo	112.57	10.37 : 1	10.85	Helo
Acft	<u>1581.93</u>	1.58 : 1	<u>998.16</u>	Acft
Total	10,250.75	3.68 : 1	2,787.36	Total

There are only 2 areas in which the Kuwaiti/Saudi coalition meet the 3 : 1 requirement in terms of combat capability, Anti-tank and combat aircraft. When grouped by functional category in Table 57 the Kuwaitis and Saudis meet the requirement in only one area, air defense and combat aircraft. However, the grouped categories of tanks, anti-tank weapons and attack helicopters yields a correlation of 4.78 : 1 vice the individual correlations of 5.76, 2.10 and 10.37 : 1 respectively.

As was the case in terms of the combat potential correlation, now the Kuwaitis and Saudis are in excess of the 3 : 1 heuristic in air defense and combat aircraft by a total of 447.18 units of combat capability. By dedicating the units to an anti-armor and counter battery (artillery) role the resulting correlations would become

Table 57

COF BY FUNCTIONAL AREA

	<u>IRAQ</u>	<u>COF</u>	<u>KUWAIT/SAUDI</u>	
TANK/AT				TANKS/AT
ATK HELO	3608.35	4.78 : 1	754.58	ATK HELO
APC/IFV	2951.20	5.21 : 1	566.41	APC/IFV
ARTY	1585.85	4.99 : 1	317.49	ARTY
AIR DEF/				AIR DEF/
CBT ACFT	2105.33	1.83 : 1	1148.95	CBT ACFT
TOTAL CC	10,250.75	3.68 : 1	2,787.46	TOTAL CC
3 : 1 for air defense and combat aircraft, 3 : 1 for artillery and 3.6 : 1 for tank, anti-tank and attack helicopter.				

Combat Capability - Coalition Forces

Table 58 below lists the combat capability adjustment factors for the coalition forces. Their overall combat capability adjustment factor is .835. This results in an overall reduction of 17% from the combat potential scores. When compared to the 57% reduction for the Iraqi forces (see Table 51) this yields a considerable difference in terms of the correlation of forces.

The coalition forces highest combat capability adjustment factor comes in the area of fire support. This factor describes the ability to bring to bear the effects of artillery, attack helicopters, combat aircraft and

naval gunfire. The .92 adjustment factor is the most impressive of all that were returned by the expert panel. The coalition forces lowest scores, .77 for maintenance and .79 for intelligence (military intelligence) were .22 higher than the Iraqi forces highest score (.55 for engineering support).

TABLE 58

Combat Capability Adjustment Factors - Coalition

	<u>Mean</u>	<u>Variance</u>	<u>Standard Deviation</u>
Maneuver	.80	.02	.14
Sustainment	.82	.03	.17
Unit Level Training	.83	.01	.08
Fire Support	.92	.005	.07
Engineer Support	.85	.02	.14
Intelligence	.79	.02	.13
Maintenance	.77	.01	.10
Command and Control	.82	.01	.09
Air Defense	.89	.005	.07
Individual Training	.86	.01	.09

Table 59 shows the combat capability of the coalition forces. Using the PIE model here, the combat potential score is reduced by 17%. The Iraqi conversion with the PIE model resulted in a 57% loss. The net effect then is a 40% gain for the coalition forces in each weapons category and as a total force package.

Table 59

Combat Capability - Coalition Forces

	Combat <u>Potential</u>	X	Combat Capability <u>Adjustment Factor</u>	=	Combat <u>Capability</u>
Tanks	6536.20		.835		5457.27
APC/IFV	7097.00		.835		5925.99
Artillery	3748.50		.835		3125.99
Anti-Tank	2314.40		.835		1932.52
Air Defense	625.30		.835		521.87
Atk Helo	1004.40		.835		838.67
Cbt Acft	<u>20369.50</u>		.835		<u>17008.53</u>
Combat			Combat		
Potential =	41,695.50		Capability =		34,815.74

Finally, Table 60 reflects the correlation of forces in terms of combat capability between the coalition forces and Iraq. This table reflects the attacker as the coalition and Iraq as the defending force.

TABLE 60

Correlation of Forces - Combat Capability

	<u>Coalition</u>	<u>COF</u>	<u>Iraq</u>	
Tanks	5457.27	1.79 : 1	3040.17	Tanks
APC/IFV	5925.99	2.00 : 1	2951.30	APC/IFV
Arty	3748.50	2.36 : 1	1585.85	Arty
AT	1932.52	4.24 : 1	455.61	AT
AD	521.87	1.00 : 1	523.40	AD
Helo	838.67	7.45 : 1	112.57	Helo
Acft	<u>17008.53</u>	10.75 : 1	<u>1581.93</u>	Acft
Total	34,815.74	3.39 : 1	10,250.75	Total

CHAPTER VII

CONCLUSIONS

This final chapter relates the information contained in Chapters 2 through 6 to the original hypotheses. In each case, the results are expanded beyond the simple acceptance or rejection of the hypotheses. The data supports the acceptance of each hypothesis.

The operative phrase in each hypothesis is "significant". It must be restated here that the problems being examined deal with the clash of armed forces in combat, a very messy process. While differences of .001 or .005 may have significance in laboratory experiments, those figures would not be considered significant for measuring results on this scale. To meet the test of being significantly different, the figures must vary by a minimum of 10% in the total force comparison.

Hypothesis 1: That the correlation of forces between two opposing sides is significantly different on a quantitative scale (Combat Potential) than on a numeric scale (Bean Count).

Table 61 on the following page shows the correlation of forces between Iraq and the Kuwait/Saudi forces immediately prior to the initiation of hostilities in August, 1990. In terms of the bean count, the Kuwaiti and Saudi forces have met or exceeded the heuristic in 3 different categories, APC/IFV, anti-tank and combat aircraft. Under the combat potential column, the 3 : 1 requirement has only been met in 2 categories, anti-tank and combat aircraft combat potential.

TABLE 61

HYPOTHESIS 1

CORRELATION OF FORCES COMPARISONS

<u>Bean Count COF</u>		<u>Combat Potential COF</u>	
(Iraq : Kuwait/Saudi)		(Iraq : Kuwait/Saudi)	
6.9 : 1	Tanks	5.34 : 1	
3.0 : 1	APC/IFV	4.83 : 1	
6.3 : 1	Arty	4.63 : 1	
2.6 : 1	AT	1.95 : 1	
3.9 : 1	AD	3.22 : 1	
10.3 : 1	Atk Helo	9.61 : 1	
2.3 : 1	Cbt Acft	1.47 : 1	
3.9 : 1	Total	3.41 : 1	

The differences are apparent. Kuwait and Saudi Arabia have gotten closer to fulfilling the 3 : 1 requirement in every area in the combat potential column except in infantry fighting vehicles. Table 62 examines the differences from the heuristic and the bean count.

TABLE 62

HYPOTHESIS 1

MEETING THE REQUIREMENTS - BEAN COUNTS

	COF	COF	%
	(Iraq : Kuwait/Saudi)	Heuristic	
TANKS	6.9 : 1	3 : 1	43%
APC/IFV	3.0 : 1	3 : 1	100%
ARTY	6.3 : 1	3 : 1	47%
AT	2.6 : 1	3 : 1	115%
AD	3.9 : 1	3 : 1	76%
ATK HELO	10.3 : 1	3 : 1	29%
CBT ACFT	2.3 : 1	3 : 1	130%
TOTAL	3.9 : 1	3 : 1	77%

As the table above clearly shows the Kuwait/Saudi force have satisfied the heuristic with 100% of the APC/IFV, 115% of the anti-tank and 130% of the combat aircraft bean counts. They are far short in all other categories however and end up with only 77% of the required numbers for the total correlation. This, despite outspending the Iraqis \$1.44 for every \$1 for the six year period preceding Iraq's invasion of Kuwait.

Table 63 on the following page shows the dramatic differences between a simple bean count and the same correlation viewed in terms of combat potential. While they still fall well short of the 3 : 1 requirement, the

Kuwaitis and Saudis improve in all 8 categories measured. Table 64 shows just how big the difference actually is between the bean count and combat potential correlations.

TABLE 63

HYPOTHESIS 1

MEETING THE REQUIREMENTS - COMBAT POTENTIAL

	COF	COF	%
	(Iraq : Kuwait/Saudi)	Heuristic	
TANKS	5.34 : 1	3 : 1	56%
APC/IFV	4.83 : 1	3 : 1	62%
ARTY	4.63 : 1	3 : 1	65%
AT	1.95 : 1	3 : 1	154%
AD	3.22 : 1	3 : 1	93%
ATK HELO	9.61 : 1	3 : 1	31%
CBT ACFT	1.47 : 1	3 : 1	204%
TOTAL	3.41 : 1	3 : 1	88%

A quick look at the table above shows that the Kuwaitis and Saudis have made gains in all categories except APC/IFV or infantry fighting vehicles. In this case they dropped from having attained 100% of the requirement according to the bean count to having only 62% of the combat potential required. The reasons for this are found by examining the SUA charts in Appendix 1 and the earlier (Chapter 3 and 4) tables dealing with bean counts and combat potential. The dramatic rise in

the numbers of APC/IFVs for the Saudis came in the form of U.S. M113 armored personnel carriers. This vehicle, first introduced in the U.S. inventory in 1947 is simply no match for the Iraqi's Soviet built BMP and BMP-2 IFVs.

TABLE 64
HYPOTHESIS 1
THE DIFFERENCE

	BEAN COUNT	COMBAT POTENTIAL	DIFFERENCE
TANKS	43%	56%	13%
APC/IFV	100%	62%	38%
ARTY	47%	65%	18%
AT	115%	154%	39%
AD	77%	93%	16%
ATK HELO	29%	31%	2%
CBT ACFT	130%	204%	74%
TOTAL	77%	88%	11%

All of the above figures differ significantly with the exception of attack helicopters. This variable is based on too small a number (only 18 on the Kuwait/Saudi side) to force the rejection of the hypothesis. Even with this small a number the percentage difference did move 2%. As we shall see in the upcoming tables, the differences are similar when comparing the Iraqi and coalition forces.

Table 65 below looks at the correlation of forces for the Iraqi and coalition forces as of 16 January 1991 in terms of both bean counts and combat potential.

TABLE 65

HYPOTHESIS 1

CORRELATION OF FORCES COMPARISONS

<u>Bean Count COF</u>		<u>Combat Potential COF</u>	
(Coalition : Iraq)		(Coalition : Iraq)	
.67 : 1	Tanks	.93 : 1	
.78 : 1	APC/IFV	1.04 : 1	
.72 : 1	Arty	1.03 : 1	
2.0 : 1	AT	2.20 : 1	
.41 : 1	AD	.52 : 1	
2.8 : 1	Atk Helo	3.87 : 1	
3.14 : 1	Cbt Acft	5.59 : 1	
.9 : 1	Total	1.76 : 1	

The coalition forces meet the 3 : 1 in only one category in the bean count analysis. This appears to run directly counter to the type of bean count analysis reported by Representative Aspin's panel (see footnote 8, page 43). The overall correlation of .9 : 1 is 82% short of the 5 : 1 correlation the congressional panel suggests.

As mentioned in Chapter 4, the military operational community still deals primarily with the bean count

process for its planning and decision making. This is clearly what one U.S. Army division commander was referring to when he made the following statement:

I don't care how good the Iraqis were, there were 42 divisions up there. We were attacking with seven Army and two Marine divisions. The French had one division and we had the British division we knew we could count on. The force ratios were out of sync with what we would normally have in an offensive operation. (9)

Table 66 reinforces the point made earlier with respect to not meeting the 3 : 1 requirement.

TABLE 66

HYPOTHESIS 1

MEETING THE REQUIREMENTS - BEAN COUNTS

	COF	COF	%
	(Coalition : Iraq)	Heuristic	
TANKS	.67 : 1	3 : 1	22%
APC/IFV	.78 : 1	3 : 1	26%
ARTY	.72 : 1	3 : 1	24%
AT	2.0 : 1	3 : 1	66%
AD	.41 : 1	3 : 1	14%
ATK HELO	2.8 : 1	3 : 1	93%
CBT ACFT	3.14 : 1	3 : 1	105%
TOTAL	.90 : 1	3 : 1	30%

9. Donnelly, Tom, "The General's War", Army Times, 02 March 1992, (Times Publishers, Arlington, VA) pg. 12

Table 67 examines the coalition forces in terms of combat potential and the 3 : 1 requirement.

TABLE 67

HYPOTHESIS 1

MEETING THE REQUIREMENTS - COMBAT POTENTIAL

	COF	COF	%
	(Coalition : Iraq)	Heuristic	
TANKS	.93 : 1	3 : 1	31%
APC/IFV	1.04 : 1	3 : 1	35%
ARTY	1.03 : 1	3 : 1	34%
AT	2.20 : 1	3 : 1	73%
AD	.52 : 1	3 : 1	17%
ATK HELO	3.87 : 1	3 : 1	129%
CBT ACFT	5.59 : 1	3 : 1	186%
TOTAL	1.76 : 1	3 : 1	58

As mentioned earlier this type of analysis is usually associated with combat modeling. If the heuristic is correct and a force can successfully defend with a 3 : 1 attacker to defender ratio, then it follows logically that an attacker must enjoy an advantage of more than 3 : 1 to be successful. Since the coalition forces had barely more than 50% of the combat potential required to reach even the 3 : 1 level, it is not difficult to see how some of the more dire predictions found their way into the pre-war debate in the U.S.

The final step for the coalition forces is to examine the differences in Table 68

TABLE 68

HYPOTHESIS 1

THE DIFFERENCE

	BEAN COUNT	COMBAT POTENTIAL	DIFFERENCE
TANKS	22%	31%	09%
APC/IFV	26%	35%	09%
ARTY	24%	34%	10%
AT	66%	73%	06%
AD	14%	17%	03%
ATK HELO	93%	129%	36%
CBT ACFT	105%	186%	81%
TOTAL	30%	58%	28%

The overall difference between the bean count and combat potential scores for the coalition forces is an increase of 28%. In those areas where hard data (as opposed to doctrinal data) were available, tanks, artillery, attack helicopters and combat aircraft, the differences were 9%, 10%, 36% and 81% respectively. Once again, the data supports the hypothesis.

On the basis of the information provided above, hypothesis 1 is accepted. The second hypothesis is examined on the following pages.

Hypothesis 2 - That the correlation of forces between two opposing sides is significantly different on a mixed quantitative and qualitative scale, (Combat Capability) than on either a strictly quantitative (Combat Potential) or numeric (Bean Count) scale.

Table 69 below shows the 3 different correlations of force, bean counts, combat potential and combat capability. In each case except the APC/IFV category the Kuwaiti/Saudi forces move closer towards obtaining the 3 : 1 goal when moving from the bean count to combat potential. When the combat capability adjustment factor is applied to each side, the Kuwaiti/Saudi forces move farther away from reaching the goal.

TABLE 69

HYPOTHESIS 2

CORRELATION OF FORCES COMPARISON

	Bean Count COF (Iraq:Ku/SA)	CP COF (Iraq:Ku/SA)	CC COF (Iraq:Ku/SA)
Tanks	6.9 : 1	5.34 : 1	5.76 : 1
APC/IFV	3.0 : 1	4.38 : 1	5.21 : 1
Arty	6.3 : 1	4.63 : 1	4.99 : 1
AT	2.6 : 1	1.95 : 1	2.10 : 1
AD	3.9 : 1	3.20 : 1	3.22 : 1
Atk Helo	10.3 : 1	9.60 : 1	10.37 : 1
Cbt Acft	2.3 : 1	1.47 : 1	1.58 : 1
Total	3.9 : 1	3.41 : 1	3.68 : 1

The differences seen in the proceeding table appear slight. The reason for this is that the combat capability adjustment factors for Iraq and the Kuwaiti/Saudi coalition differ by only 3.2% The combat capability adjustment factor for Iraq was .434 and for the Kuwaiti/Saudi forces .402. Table 70 shows how the Kuwaiti and Saudi forces fared against the heuristic for each of the categories in terms of bean counts, combat potential scores and the combat capability adjustment factors.

TABLE 70

HYPOTHESIS 2

The Difference - Kuwait / Saudi Arabia

	BEAN COUNT	COMBAT POTENTIAL	COMBAT CAPABILITY
TANKS	43%	56%	52%
APC/IFV	100%	62%	57%
ARTY	47%	65%	60%
AT	115%	154%	143%
AD	97%	93%	85%
ATK HELO	29%	31%	28%
CBT ACFT	130%	204%	189%
TOTAL	77%	88%	81%

In every category the Kuwaitis and Saudis were slightly worse off in terms of combat capability compared to combat potential. This is the result of the .032 difference in the combat capability adjustment factors.

The Iraqi combat potential scores were lowered by 57% for each category while the Kuwaiti and Saudi combat potentials were lowered by 60%.

This analysis produced 2 distinct surprises for the researcher. First, that the Kuwaitis and Saudis had actually outspent the fourth largest army in the world by more than 30% (\$1.44 for every \$1) in the 6 year period leading up to Iraq's invasion of Kuwait. The second surprise was how close the expert panel rated these two forces.

While there was a good deal written in the months following Iraq's invasion of Kuwait about their military prowess and the hardening of their soldiers during the long Iran - Iraq war, few military professionals were impressed with Iraq's performance in that war. As such, it was not surprising to see the Iraqis placed where they were in terms of a middle to low combat capability adjustment factor (.434). What was surprising was that the Saudi and Kuwaiti forces were placed as high as they were at .402. These are forces which, while well equipped, are generally believed to be both poorly trained and poorly led, this despite their vast expenditures on military hardware.

The histogram on the following page graphically portrays the different correlations by category for bean counts, combat potential and combat capability for Iraq, Kuwait/Saudi Arabia and the coalition forces.

FIGURE 10
HEURISTIC COMPARISON

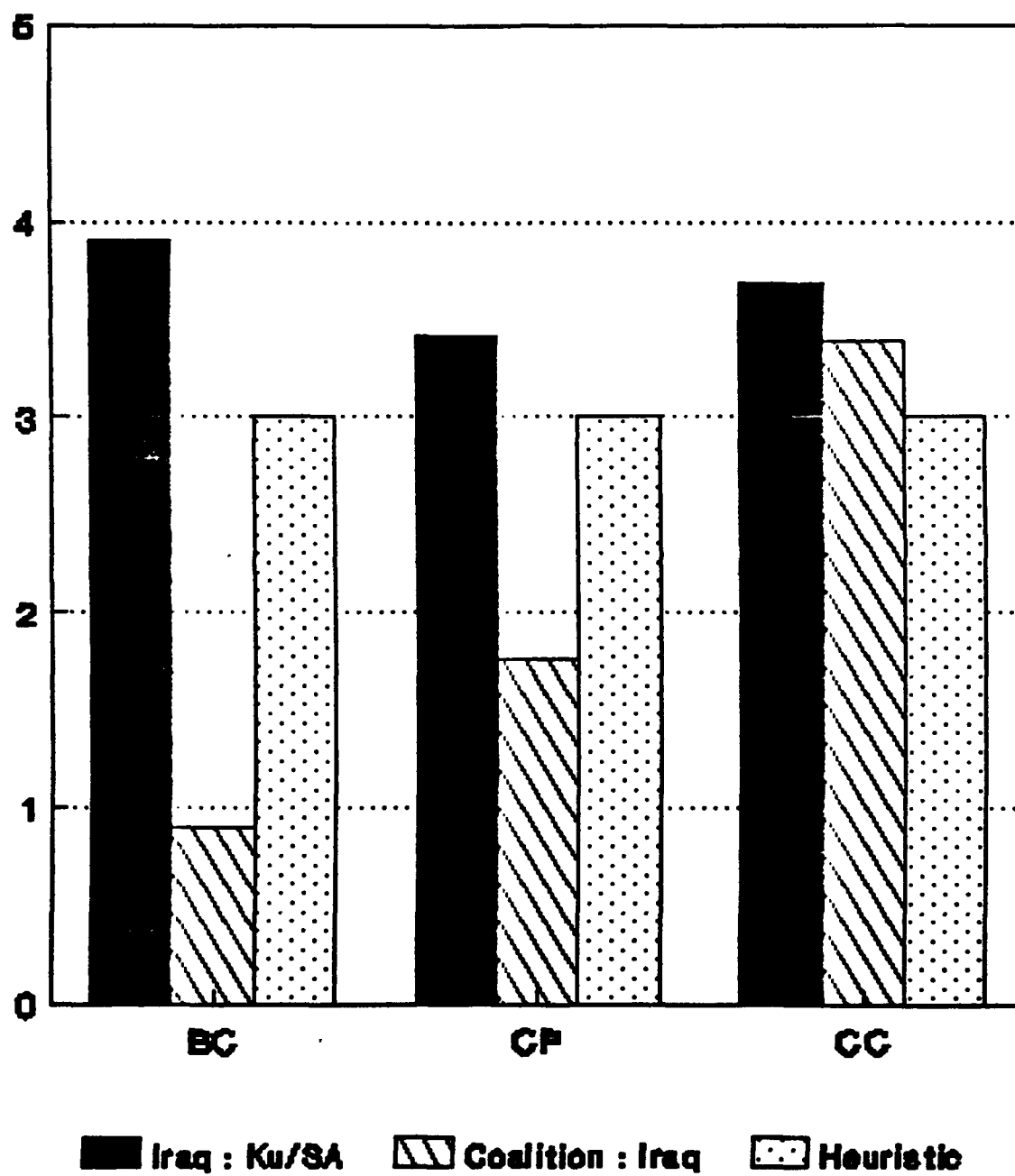


Table 71 below shows the differences in correlation of forces for the coalition and Iraqi forces. Table 72 depicts the percentage differences between the coalition forces and the heuristic for the bean count, combat potential and combat capability analyses. The differences here are much more dramatic. While the differences between the Arab forces (Iraq, Kuwait, Saudi Arabia) amounted to only .032 (.434 and .402), the difference between the coalition forces and the Iraqis is .401. The combat capability adjustment factor for the coalition forces of .835 means that their combat potential was reduced by 17% while that of the Iraqis was being reduced by 57%.

TABLE 71
HYPOTHESIS 2
CORRELATION OF FORCES COMPARISON
(COALITION : IRAQ)

	Bean Count COF	CP COF	CC COF
Tanks	.67 : 1	.93 : 1	1.79 : 1
APC/IFV	.78 : 1	1.04 : 1	2.00 : 1
Arty	.72 : 1	1.03 : 1	2.36 : 1
AT	2.0 : 1	2.20 : 1	4.24 : 1
AD	.41 : 1	.52 : 1	1.00 : 1
Atk Helo	2.8 : 1	3.87 : 1	7.45 : 1
Cbt Acft	3.1 : 1	5.59 : 1	10.75 : 1
Total	.9 : 1	1.76 : 1	3.39 : 1

The differences are much more apparent in this case. While the Kuwaitis and Saudis were never able to reach an acceptable correlation of forces to be able to defend, as we see in the combat capability column in Table 71, now it is the Iraqis who appear to be unable to meet the heuristic for defense. Table 72 presents the same information in a slightly different format. In this case the percentage figures represent the coalitions percentage of the 3 : 1 correlation.

TABLE 72

HYPOTHESIS 2

The Difference - Coalition Forces

	BEAN COUNT	COMBAT POTENTIAL	COMBAT CAPABILITY
TANKS	22%	31%	60%
APC/IFV	26%	35%	66%
ARTY	24%	34%	78%
AT	66%	73%	141%
AD	14%	17%	33%
ATK HELO	93%	129%	248%
CBT ACFT	105%	186%	358%
TOTAL	30%	58%	113%

On the basis of the information provided on the preceding pages, the second hypothesis is accepted.

Closing Thoughts

This thesis has examined four different ways to to determine a nation's security needs in a regional, or global for that matter, balance of power arrangement. These were by defense expenditures in terms of both dollars and percentage of GDP; numbers of and types of weapons acquired (bean counts); the quantitative measures of the weapons (combat potential) and, finally, the qualitative measures of the people who employed the weapons (combat capability). Some would argue that the question can be answered by looking at these four levels independently or that the dollar amount and bean count are all that are needed to successfully answer the question. Still others, in the Luttwak school, would argue that the answer lies in the understanding of what I have referred to as combat potential.

The data clearly does not support the first argument. The Kuwaitis and Saudis clearly outspent Iraq. If they spent that much more money then why were they not closer to meeting the heuristic, at least in terms of a bean count? The answer to this question reveals as much about the supplier as it does about the recipient. As Salomone and Louscher point out, not all of the expenditures go towards the purchase of weapons. Looking at U.S. military sales to the entire world, they state that only 38% of the dollar expenditure is for weapons, while 14% goes for support equipment

(trunks, uniforms and the like), 17% for spare parts and 31% in the form of support services (10). These support services include training, the upgrading of existing equipment and, most of all in the case of Saudi Arabia, the building of a military infrastructure (ports, rail, airports, roads).

For those who looked at the overwhelming advantage in combat potential the coalition forces enjoyed in terms of air power and decided that the Gulf war could be won with air power alone, the following statement from a captured Iraqi Tank Battalion commander is offered: "When the war started I had 39 T-72s; after 38 days of air attacks I was down to 32. After 20 minutes against the 2nd Armored Cavalry Regiment I was down to zero." (11) The point is that to be effective, all four levels of analysis must be employed and it must be employed against both potential adversaries. This type of net assessment will provide the most consistent results.

To assist in this type of analysis, two small models have been utilized in the development of this thesis. The first, the linear regression model introduced in Chapter 5, Arms Sales Threat Assessment (ASTA), provides a quick

10. Louscher, D.J. and Salomone, M.D., Technology Transfer and U.S. Security Assistance, (Westview Press, Boulder, CO., 1987) Figure 3.9, pg. 35

11. The United States Army Posture Statement FY 1993, (U.S. Government Printing Office, Washington D.C., March, 1992) pg. 3

and easy way to determine combat potential shortages in any order of battle. ASTA can also be utilized to predict the combat potential required to meet a particular correlation of forces threshold. The second model, introduced in Chapter 6 is tentatively called the Predictive Intelligence Estimate or PIE. The PIE model is used in conjunction with the ASTA results to determine a given force's combat capability.

These are incredibly simple (elegant) models. Their data requirements are can be satisfied with existing resources and they have practical application from the Department of Defense at least down to theater or corps level. This is not the cutting edge of technology. Both models can be run manually, although a much quicker application would be the creation of a data base (on floppy diskette) and some commercially available spreadsheet package such as Lotus 123.

There will be those who say that the models are in fact too simple to be applied for such a process. I offer no counter argument except for this quotation from the British mathematician and modeler Michael Nicholson:

It is not very helpful to say that this is an extremely simple model and might be expected to give a rather curious picture of the real world. To derive comfort from this, one would have to assume that an increase in complexity leads to an increase in stability, a proposition for which neither mathematics nor life offers much support. (12)

12. Nicholson, Michael, Formal Theories in International Relations, (Cambridge University Press, London, 1989) pg. 152

While the models are not complex, the emerging new world order is and will continue to be. Figure 1 in Chapter 1 showed how few years of peace the world has enjoyed since the beginning of recorded history. Figure 11 on the following page shows how the U.S. , a nation which considers itself to be peace loving and non-aggressive, has fared since its founding. Close examination of that figure will show that the U.S. has sent its sons and daughters into the breach on the average of once every 2 1/2 years for the past 216 years.

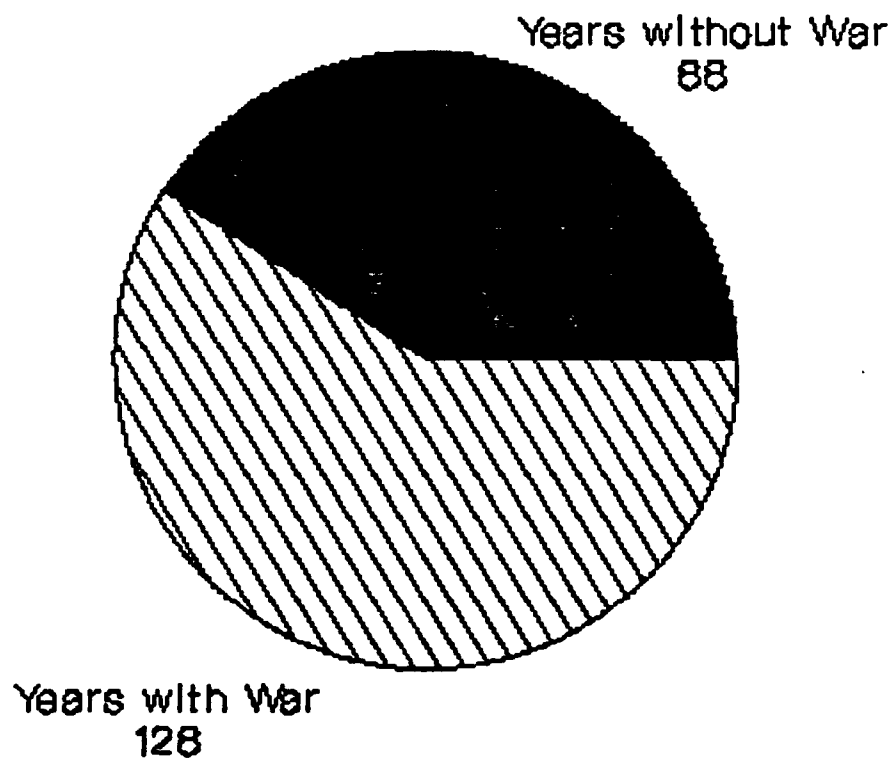
What is to become of the new world order? Will it be a more pacific place or one that continues to be armed to the teeth? This is not a new question. In his report to the Secretary of War in 1945 General George C. Marshall wrote the following:

Returning from France after the last war with General Pershing, I participated in his endeavors to persuade the nation to establish and maintain a sound defense policy. General Pershing was asked against whom do we prepare? Obviously that question could not be answered specifically until 20 years later when Adolf Hitler led the replenished armies of defeated Germany into world conflict. Even as late as 1940, I was asked very much the same question before a committee of congress. Not even then could I say definitely, exactly where we might have to fight. (13)

General Powell no doubt wrestles with this same question today. If the U.S. is to remain committed to the concept of maintaining balances of power, it must

13. The United States Army Posture Statement FY 1993, (U.S. Government Printing Office, Washington D.C., March, 1992) pg. 3

Figure 11
U.S. Military Action



have both the technical and manufacturing wherewithal to be able to supply it friends and allies with the weapons they require. This was not a difficult task in the Cold War period when defense industries were booming. It is becoming more difficult every day.

One final comment on the Iraqi invasion of Kuwait and the subsequent Gulf War. Prior to the initiation of hostilities by the coalition forces, many, principally those who were bean counters predicted a long, drawn out disaster for the U.S. An examination of the correlation of forces in terms of combat capabilities for Iraq prior to their invasion of Kuwait, and of the coalition forces prior to the start of the Gulf War reveals that the two were very similar. Iraq enjoyed a 3.68 : 1 advantage over Kuwait and the coalition forces enjoyed a 3.39 : 1 edge over the Iraqis. The outcomes of the 2 attacks were also quite similar.

One well known pundit, no doubt familiar with the process of net assessment, was asked what he thought would happen if the coalition forces actually got into a shooting war with Iraq. Would the U.S. be embarrassed as they were in Iran? Would this become another Vietnam? No he said, "it'll be a turkey shoot." He was one of the few who got it right.

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APPENDIX I

STANDARD UNITS OF ARMAMENT

<u>WEAPONS</u>	<u>SUA Factor</u>
<u>Infantry Weapons</u>	
M-113	.4
M2/3 BRADLEY	1.6
SALADIN	.6
SACREN	.8
BMP	1.1
BMP-2	1.4
BMP-1976	1.4
BTR-50	.1
BTR-60	.1
BTR-70	.3
BTR-80	.3
BMD	1.1
BRDM	.4
BRDM-2	.4
<u>Tanks</u>	
M-1948	1.2
M60A1	1.3
M60A2	1.5
M60A3	1.7
M1A1	2.0
VICKERS	1.3
CENTURION	1.5
CHIEFTAN	1.8
AMX-10	.9
AMX-30	1.6
PT-76	.5
T-54	1.0
T-55	1.0
T-55 (Chinese)	.8
M-60 (Romanian)	.7
T-62	1.2
T-64	1.6
T-69 (Chinese)	1.2
T-72	1.7

<u>WEAPONS</u>	<u>SUA Factor</u>
<u>Attack Helicopters</u>	
BLACKHAWK	1.2
COBRA	2.0
APACHE	2.4
GAZZELLE	1.5
SUPER FRELON	1.3
SA-316B	1.3
BO-105	1.0
Mi-2	1.0
Mi-8	1.3
Mi-24	1.7
<u>Artillery</u>	
107mm	.1
120mm	.89
M109	.9
M114A1	1.0
M109A1	1.0
M109A2/A3	1.2
M198	1.3
M102A2	1.4
MLRS	2.2
AATACMS	3.1
2S1	.89
2S3	1.6
2S5	.87
2S7	.75
D-30	.78
BM-21	.96
BM-14	1.0
BM-27	1.3
203mm	.75
FROG-7	1.0
SCUD	1.3
SCUD-B	1.85
SS-21	3.0
<u>Anti-Tank</u>	
M72A1	.1
AT-4(USA)	.44
DRAGON	.2
TOW	.5
TOW-II	.85
HOT	.3
AT-3	.3
AT-4(USSR)	.35
AT-5	.5

<u>WEAPONS</u>	<u>SUA Factor</u>
<u>Anti-Tank (continued)</u>	
T-12	.4
RPG-7	.1
RPG-9	.28
RPG-16	.3
<u>Air Defense</u>	
REDEYE	.1
STINGER	.3
CHAPPERAL	.4
HAWK	.7
I-HAWK	.9
VULCAN	.3
CROATALE	.4
SA-2	.4
SA-3	.4
SA-6	.5
SA-7	.1
SA-9	.2
SA-14	.3
S-60	.3
ZSU-23	.1
ZSU-23-4	.3
KS-19	.2
<u>Combat Aircraft</u>	
A-6	8.0
A-7	10.0
A-10	6.5
AC-130	6.0
B-52	16.0
F-4	7.5
F-5	8.0
F-14	12.5
F-15	12.5
F-16	14.5
F-18	14.5
F-111	13.0
F-117	13.0
J7 (Chinese)	6.0
J8 (Chinese)	7.5
MIRAGE	11.0
MiG-21	3.5
MiG-23	4.5
MiG-25	7.5
MiG-29	10.0

<u>WEAPONS</u>	<u>SUA Factor</u>
<u>Combat Aircraft (continued)</u>	
Su-25	9.5
Su-27	11.0
Tu-8	8.0
Tu-16	10.0
B-15	14.0

APPENDIX II

COMBAT POTENTIAL

IRAQ	SUA	CP
TANKS		
1500 X T-72	1.6	2400
1000 X T-62	1.2	1200
1000 X T-55	1	1000
250 X T-54	1	250
1000 X T-69(CHINA)	1.6	1600
500 X T-55(CHINA)	0.8	400
150 X M-60(ROMANIA)	0.7	105
100 X PT-76	0.5	50
5500	TOTAL CP =	7005

	SUA	CP
APC/IFV		
6000 X BMP	1.1	6600
250 X BTR-70	0.3	75
800 X BTR-60	0.1	80
450 X BTR-50	0.1	45
7500		6800

	SUA	CP
ARTILLERY		
700 X 122mm (TOWED)	0.7	490
400 X 152mm (TOWED)	0.75	300
400 X 130mm (TOWED)	0.78	312
600 X 122SP	0.89	534
700 X 152SP	1.6	1120
50 X 155SP	1.3	65
275 X 203SP	0.75	206.25
150 X BM-21	0.96	144
50 X BM-14	1	50
411 X 12mm MORTAR	0.89	365.79
30 X FROG-7	1	30
20 X SCUD-B	1.85	37
3786		3654.04

ANTI-TANK	SUA	CP
706 X AT-3	0.3	211.8
800 X AT-4	0.35	280
600 X T-12	0.4	240
1000 X RPG-9	0.28	280
152 X T-85	0.25	38
-----		-----
3258	TOTAL CP =	1049.8

AIR DEFENSE	SUA	CP
1000 X S-60	0.3	300
1700 X ZSU-23-4	0.3	510
300 X ZSU-23	0.1	30
750 X SA-9	0.2	150
450 X SA-7	0.1	45
210 X SA-14	0.3	63
120 X SA-2	0.4	48
150 X SA-3	0.4	60
-----		-----
4680		1206

ATK HELO	SUA	CP
52 X MI-24	1.7	88.4
50 X GAZZELE	1.5	75
10 X SUPER FRELON	1.3	13
30 X SA-316B	1.3	39
44 X BO-105	1	44
-----		-----
186		259.4

COMBAT AIRCRAFT	SUA	CP
8 X Tu-16	8	64
8 X Tu-16	10	80
70 X MIG-23	4.5	315
94 X MIRAGE	7.5	705
48 X MIG-29	10	480
24 X J8	7.5	180
16 X J7	6	96
160 X MIG-25	7.5	1200
150 X MIG-21	3.5	525
-----		-----
578		3645

COMBAT POTENTIAL

KUWAIT/SAUDI	SUA	CP
TANKS		
300 X AMX-30	1.6	480
165 X CENTURIANS	1.5	247.5
70 X CHIEFTANS	1.8	126
70 X VICKERS	1.3	91
150 X M1A1	2	300
40 X M60A3	1.7	68
795	TOTAL CP =	1312.5
	SUA	CP
APC/IFV		
1675 X M-113	0.4	670
200 X AMX-80	1.3	260
350 X AMX-10	0.9	315
100 X SALADIN	0.6	60
130 X SACREN	0.8	104
2455	TOTAL CP =	1409
	SUA	CP
ARTILLERY		
60 X 155(TOWED)	1	60
275 X M109A2	1.4	385
250 X M198	1.3	325
6 X BM-27	1.3	7.8
12 X FROG-7	1	12
603	TOTAL CP =	789.8
	SUA	CP
ANTI-TANK		
400 X TOW	0.5	200
256 X I-TOW	0.85	217.6
600 X DRAGON	0.2	120
1256	TOTAL CP =	537.6
	SUA	CP
ATTACK HELOS		
18 X GAZZELE	1.5	27
18	TOTAL CP =	27

COMBAT POTENTIAL

COALITION	SUA	CP
TANKS		
200 X AMX-30	1.6	320
1702 X M1A1	2	3404
327 X CHIEFTANS	1.8	588.6
450 X T-62	1.2	540
300 X T-72	1.6	480
708 X M60A3	1.7	1203.6
3687	TOTAL CP =	6536.2
APC/IFV		
1200 X M-113	0.4	480
4092 X BRADLEY	1.5	6138
350 X AMX-10	0.9	315
100 X SALADIN	0.6	60
130 X SACREN	0.8	104
5872	TOTAL CP =	7097
ARTILLERY		
60 X 155(TOWED)	1	60
1268 X M109A2	1.4	1775.2
1169 X M198	1.3	1519.7
70 X 2S1	1.6	112
94 X 2S3	1.4	131.6
50 X MLRS	3	150
2711	TOTAL CP =	3748.5
ANTI-TANK		
2900 X TOW	0.5	1450
256 X I-TOW	0.85	217.6
3234 X DRAGON	0.2	646.8
6390	TOTAL CP =	2314.4
ATTACK HELOS		
438 X APACHE	2	876
70 X GAZZELLE	1.5	105
18 X SA316B	1.3	23.4
526	TOTAL CP =	1004.4

AIR DEFENSE	SUA	CP
	-----	-----
154 X I-HAWK	0.9	138.6
12 X SA-8	0.8	9.6
18 X SA-6	0.5	9
68 X CROTALE	0.4	27.2
464 X STINGER	0.3	139.2
497 X SA-7	0.1	49.7
360 X VULCAN	0.3	108
360 X CHAPPERAL	0.4	144
-----		-----
1933	TOTAL CP =	625.3

COMBAT AIRCRAFT	SUA	CP
	-----	-----
164 X A10	6.5	1066
83 X F5	8	664
208 X F15	12.5	2600
163 X MIRAGE	11	1793
204 X TORANADO	8	1632
249 X F16	14.5	3610.5
80 X F111	13	1040
44 X F117	13	572
276 X F18	12.5	3450
244 X F14	12.5	3050
80 X A6	8	640
18 X B52	14	252
-----		-----
1813	TOTAL CP =	20369.5

APPENDIX 3 **ARMS SALES THREAT ASSESSMENT**

The following statistical calculations form the basis of ASTA. Its purpose is to predict the requirement, in terms of units of combat potential, for any potential recipient of U.S. security assistance.

x = The 1990 CP of Kuwaiti and Saudi forces.

y = the heuristic for defense of 3 units of threat combat potential for every 1 unit of friendly combat potential.

	X	Y	X - XBAR
TANKS	1312.5	2332.66	321.93
APC/IFV	1409	2264.4	418.43
ARTY	789.8	1216.79	-200.77
AT	537.6	349.58	-452.97
AD	375.1	401.6	-615.47
ATK HELO	27	86.38	-963.57
CBT ACFT	2483	1213.78	1492.43

	6934	7865.19	0
XBAR =	990.57		
YBAR =		1123.60	

Y - YBAR	(X - XBAR) SQED
1209.06	103638.0
1140.80	175082.4
93.19	40309.16
-774.02	205183.1
-722.00	378805.0
-1037.22	928469.8
90.18	2227343.
0	4058830.

(Y - YBAR)SQED	(x-xbar) (y-ybar)
1461829.	389231.4
1301427.	477343.9
8684.642	-18710.1
599104.7	350608.2
521281.9	444369.4
1075822.	999434.1
8132.690	134589.3
4976283.	2776866.

The regression coefficient, Beta, is derived as follows

$$\text{Beta} = \frac{\text{Sum}(x-\bar{x}) (y-\bar{y})}{\text{Sum } (x-\bar{x})^2}$$

$$\frac{2776866}{4058830} = 0.68$$

The "y intercept" or Alpha is the mean of y minus Beta * the mean of x.

$$\text{Alpha} = 445.89$$

Regression Output:

Constant	445.8948
Std Err of Y Est	784.4078
R Squared	0.381771
No. of Observations	7
Degrees of Freedom	5

X Coefficient(s)	0.684154
Std Err of Coef.	0.389351

APPENDIX IV

DEMOGRAPHIC DATA

BIOGRAPHICAL DATA

YEARS OF SERVICE

MEAN YEARS
OF SERVICE = 16.68
16 YEARS 8 MONTHS

COMMAND EXPERIENCE

YES = 20
NO = 5

SERVICE BRANCH

AIR FORCE = 3
ARMY = 21
MARINES = 0
NAVY = 1

YEARS OF COMMAND

MEAN = 1.7282
1 YEAR 8 MONTHS

MILITARY SPECIALITY

COMBAT ARMS 10
COMBAT SUPPORT 9
COMBAT SERVICE
SUPPORT 6

SOURCE OF COMMISSION

SERVICE
ACADEMY 7
ROTC 8
OCS 8
OTHER 2

BIOGRAPHICAL DATA

QUESTION 1 - YEARS OF SERVICE

16	24	MEAN =	16.68
16	17		
16	17		
16	24		
16	18		
10	20		
15	21		
15	24		
15	19		
15	17		
15	16		
15	15		
10	14		
10	14		
10	17		
12	22		
12	21		
12	19		
26	16		
26	17		
26	14		
16	17		
16	17		
15	13		
15	15		

BIOGRAPHICAL DATA

QUESTION 5 - YEARS IN COMMAND

1.5	1.5	MEAN =	1.7282
1.5	1.5		
1.5	1.5		
1.5	1.5		
1.41	3		
1.5	2		
0	2		
0	0		
0	4		
2	1		
2	1.5		
2	1.5		
1.5	1.5		
1.5	0		
1.5	2		
1.5	1.5		
1.5	3		
1.5	2		
1.5	1.5		
1.5	1.5		
1.5	1.5		
4	1.5		
5	1.5		
6	1		
2	1.5		

APPENDIX V
COMBAT CAPABILITY DATA ANALYSIS

IRAQ COMBAT CAPABILITY

MANEUVER		(X - XBAR)Squared	
0.75	0.5	0.078	0.001
0.75	0.5	0.078	0.001
0.7	0.5	0.053	0.001
0.7	0.5	0.053	0.001
0.7	0.5	0.053	0.001
0.7	0.5	0.053	0.001
0.7	0.5	0.053	0.001
0.7	0.3	0.053	0.029
0.7	0.3	0.053	0.029
0.7	0.3	0.053	0.029
0.6	0.3	0.017	0.029
0.6	0.3	0.017	0.029
0.6	0.3	0.017	0.029
0.6	0.3	0.017	0.029
0.6	0.3	0.017	0.029
0.6	0.3	0.017	0.029
0.6	0.3	0.017	0.029
0.3	0.25	0.029	0.048
0.5	0.25	0.001	0.048
0.5	0.25	0.001	0.048
0.5	0.25	0.001	0.048
0.5	0.25	0.001	0.048
0.5	0.25	0.001	0.048
0.25	0.25	0.048	0.048
MEAN = 0.47			
VARIANCE =		0.03	
STANDARD DEVIATION =		0.17	

SAUDI COMBAT CAPABILITY

MANEUVER		(X - XBAR)Squared	
0.5	0.3	0.002	0.023
0.3	0.3	0.023	0.023
0.3	0.5	0.023	0.002
0.3	0.5	0.023	0.002
0.3	0.5	0.023	0.002
0.3	0.25	0.023	0.040
0.5	0.25	0.002	0.040
0.5	0.6	0.002	0.022
0.5	0.6	0.002	0.022
0.5	0.6	0.002	0.022
0.5	0.6	0.002	0.022
0.5	0.6	0.002	0.022
0.75	0.5	0.089	0.002
0.75	0.3	0.089	0.023
0.75	0.3	0.089	0.023
0.6	0.3	0.022	0.023
0.6	0.3	0.022	0.023
0.6	0.3	0.022	0.023
0.6	0.5	0.022	0.002
0.6	0.5	0.022	0.002
0.6	0.3	0.022	0.023
0.3	0.3	0.023	0.023
0.3	0.3	0.023	0.023
0.5	0.3	0.002	0.023
0.5	0.3	0.002	0.023

MEAN = 0.451

VARIANCE = 0.02

STANDARD DEVIATION = 0.15

KUWAIT COMBAT CAPABILITY

MANEUVER		(X - XBAR)Squared	
0.2	0.33	0.017	0.000
0.2	0.33	0.017	0.000
0.2	0.33	0.017	0.000
0.2	0.2	0.017	0.017
0.2	0.2	0.017	0.017
0.2	0.2	0.017	0.017
0.33	0.4	0.000	0.005
0.33	0.4	0.000	0.005
0.33	0.4	0.000	0.005
0.2	0.4	0.017	0.005
0.2	0.5	0.017	0.029
0.2	0.4	0.017	0.005
0.4	0.4	0.005	0.005
0.4	0.4	0.005	0.005
0.4	0.4	0.005	0.005
0.4	0.4	0.005	0.005
0.4	0.2	0.005	0.017
0.4	0.5	0.005	0.029
0.15	0.33	0.032	0.000
0.15	0.4	0.032	0.005
0.15	0.4	0.032	0.005
0.4	0.4	0.005	0.005
0.4	0.4	0.005	0.005
0.4	0.4	0.005	0.005
0.4	0.5	0.005	0.029

MEAN = 0.33

VARIANCE = 0.01

STANDARD DEVIATION = 0.10

COALITION COMBAT CAPABILITY

MANEUVER		(X - XBAR)Squared	
0.65	0.65	0.023	0.023
0.65	0.7	0.023	0.010
0.65	0.98	0.023	0.032
0.65	0.65	0.023	0.023
0.65	0.65	0.023	0.023
0.7	0.65	0.010	0.023
0.98	0.65	0.032	0.023
0.98	0.98	0.032	0.032
0.98	0.7	0.032	0.010
0.7	0.7	0.010	0.010
0.7	0.7	0.010	0.010
0.7	0.9	0.010	0.010
0.7	0.9	0.010	0.010
0.7	0.9	0.010	0.010
0.7	0.9	0.010	0.010
1	1	0.040	0.040
1	0.7	0.040	0.010
1	0.7	0.040	0.010
0.9	0.7	0.010	0.010
0.9	0.7	0.010	0.010
0.9	0.7	0.010	0.010
0.9	0.9	0.010	0.010
0.9	0.9	0.010	0.010
0.9	0.9	0.010	0.010
1	0.7	0.040	0.010
MEAN = 0.8			
VARIANCE = 0.02			
STANDARD DEVIATION = 0.13			

IRAQ COMBAT CAPABILITY

SUSTAINMENT		(X - XBAR)Squared	
0.5	0.8	0.002	0.086
0.5	0.5	0.002	0.002
0.5	0.5	0.002	0.002
0.8	0.5	0.066	0.002
0.5	0.5	0.002	0.002
0.5	0.5	0.002	0.002
0.5	0.6	0.002	0.003
0.5	0.6	0.002	0.003
0.5	0.6	0.002	0.003
0.65	0.6	0.011	0.003
0.65	0.8	0.011	0.003
0.65	0.6	0.011	0.003
0.6	0.5	0.003	0.002
0.6	0.7	0.003	0.024
0.6	0.25	0.003	0.086
0.7	0.5	0.024	0.002
0.7	0.5	0.024	0.002
0.7	0.5	0.024	0.002
0.25	0.5	0.086	0.002
0.25	0.5	0.086	0.002
0.25	0.5	0.086	0.002
0.7	0.6	0.024	0.003
0.7	0.7	0.024	0.024
0.5	0.25	0.002	0.086
0.5	0.5	0.002	0.002

MEAN = 0.544

VARIANCE = 0.02

STANDARD DEVIATION = 0.13

SAUDI COMBAT CAPABILITY

SUSTAINMENT		(X - XBAR)Squared	
0.5	0.75	0.002	0.088
0.5	0.6	0.002	0.022
0.5	0.6	0.002	0.022
0.5	0.6	0.002	0.022
0.5	0.2	0.002	0.064
0.35	0.2	0.011	0.064
0.5	0.2	0.002	0.064
0.5	0.2	0.002	0.064
0.5	0.2	0.002	0.064
0.5	0.5	0.002	0.002
0.5	0.5	0.002	0.002
0.5	0.5	0.002	0.002
0.2	0.5	0.064	0.002
0.2	0.5	0.064	0.002
0.2	0.35	0.064	0.011
0.75	0.5	0.088	0.002
0.75	0.5	0.088	0.002
0.75	0.5	0.088	0.002
0.6	0.5	0.022	0.002
0.6	0.5	0.022	0.002
0.6	0.2	0.022	0.064
0.2	0.2	0.064	0.064
0.2	0.5	0.064	0.002
0.75	0.5	0.088	0.002
0.35	0.35	0.011	0.011

MEAN = 0.453

VARIANCE = 0.03

STANDARD DEVIATION = 0.17

KUWAIT COMBAT CAPABILITY

SUSTAINMENT		(X - XBAR)Squared	
0.5	0.5	0.012	0.012
0.4	0.5	0.000	0.012
0.5	0.5	0.012	0.012
0.5	0.5	0.012	0.012
0.5	0.1	0.012	0.084
0.5	0.1	0.012	0.084
0.5	0.1	0.012	0.084
0.5	0.1	0.012	0.084
0.5	0.1	0.012	0.084
0.1	0.1	0.084	0.084
0.1	0.6	0.084	0.044
0.1	0.2	0.084	0.036
0.6	0.2	0.044	0.036
0.6	0.2	0.044	0.036
0.6	0.5	0.044	0.012
0.2	0.2	0.036	0.036
0.2	0.6	0.036	0.044
0.2	0.6	0.036	0.044
0.6	0.2	0.044	0.036
0.6	0.2	0.044	0.036
0.6	0.2	0.044	0.036
0.6	0.6	0.044	0.044
0.6	0.6	0.044	0.044
0.6	0.6	0.044	0.044
0.1	0.6	0.084	0.044
MEAN = 0.39			
VARIANCE = 0.04			
STANDARD DEVIATION = 0.20			

COALITION COMBAT CAPABILITY

SUSTAINMENT		(X - XBAR)Squared	
0.8	0.8	0.000	0.000
0.8	0.8	0.000	0.000
0.7	0.8	0.015	0.000
0.8	0.95	0.000	0.017
0.8	0.8	0.000	0.000
0.8	0.8	0.000	0.000
1	0.7	0.032	0.015
1	0.8	0.032	0.000
1	0.8	0.032	0.000
0.7	0.8	0.015	0.000
0.7	1	0.015	0.032
0.7	1	0.015	0.032
1	1	0.032	0.032
1	0.7	0.032	0.015
1	0.7	0.032	0.015
0.5	0.7	0.103	0.015
0.7	1	0.015	0.032
0.7	1	0.015	0.032
0.95	1	0.017	0.032
0.95	0.7	0.017	0.015
0.95	0.7	0.017	0.015
0.7	0.5	0.015	0.103
0.7	0.95	0.015	0.017
0.5	0.95	0.103	0.017
0.7	0.95	0.015	0.017

MEAN = 0.821

VARIANCE = 0.02

STANDARD DEVIATION = 0.14

IRAQ COMBAT CAPABILITY

UNIT LEVEL
TRAINING

(X - XBAR)Squared

0.3	0.4	0.026	0.004
0.3	0.25	0.026	0.045
0.3	0.4	0.026	0.004
0.3	0.3	0.026	0.026
0.85	0.3	0.151	0.026
0.3	0.3	0.026	0.026
0.5	0.3	0.002	0.026
0.5	0.3	0.002	0.026
0.5	0.85	0.002	0.151
0.75	0.3	0.084	0.026
0.75	0.5	0.084	0.002
0.75	0.5	0.084	0.002
0.7	0.5	0.057	0.002
0.7	0.75	0.057	0.084
0.7	0.75	0.057	0.084
0.4	0.75	0.004	0.084
0.4	0.7	0.004	0.057
0.4	0.7	0.004	0.057
0.25	0.7	0.045	0.057
0.25	0.4	0.045	0.004
0.25	0.4	0.045	0.004
0.4	0.4	0.004	0.004
0.4	0.25	0.004	0.045
0.3	0.25	0.026	0.045
0.3	0.25	0.026	0.045

MEAN = 0.461

VARIANCE = 0.04

STANDARD DEVIATION = 0.19

KUWAIT COMBAT CAPABILITY

UNIT LEVEL TRAINING		(X - XBAR)Squared	
0.35	0.4	0.004	0.014
0.5	0.4	0.047	0.014
0.35	0.33	0.004	0.002
0.35	0.33	0.004	0.002
0.35	0.35	0.004	0.004
0.35	0.5	0.004	0.047
0.33	0.35	0.002	0.004
0.33	0.35	0.002	0.004
0.33	0.35	0.002	0.004
0.15	0.35	0.018	0.004
0.15	0.33	0.018	0.002
0.15	0.33	0.018	0.002
0.4	0.33	0.014	0.002
0.4	0.15	0.014	0.018
0.4	0.15	0.014	0.018
0.3	0.15	0.000	0.018
0.3	0.4	0.000	0.014
0.3	0.4	0.000	0.014
0.1	0.4	0.034	0.014
0.1	0.3	0.034	0.000
0.1	0.3	0.034	0.000
0.15	0.3	0.018	0.000
0.15	0.1	0.018	0.034
0.15	0.1	0.018	0.034
0.1	0.1	0.034	0.034

MEAN = 0.2838

VARIANCE = 0.01

STANDARD DEVIATION = 0.12

SAUDI COMBAT CAPABILITY

UNIT LEVEL TRAINING		(X - XBAR)Squared	
0.4	0.4	0.002	0.002
0.3	0.3	0.020	0.020
0.3	0.3	0.020	0.020
0.3	0.55	0.020	0.012
0.3	0.4	0.020	0.002
0.3	0.3	0.020	0.020
0.5	0.3	0.003	0.020
0.5	0.3	0.003	0.020
0.5	0.3	0.003	0.020
0.5	0.3	0.003	0.020
0.5	0.5	0.003	0.003
0.5	0.5	0.003	0.003
0.3	0.5	0.020	0.003
0.3	0.5	0.020	0.003
0.3	0.5	0.020	0.003
0.55	0.5	0.012	0.003
0.55	0.3	0.012	0.020
0.55	0.3	0.012	0.020
0.6	0.3	0.025	0.020
0.6	0.55	0.025	0.012
0.6	0.55	0.025	0.012
0.6	0.55	0.025	0.012
0.6	0.6	0.025	0.025
0.4	0.6	0.002	0.025
0.4	0.6	0.002	0.025

MEAN = 0.441

VARIANCE = 0.01

STANDARD DEVIATION = 0.12

COALITION COMBAT CAPABILITY

UNIT LEVEL TRAINING		(X - XBAR)Squared	
0.75	0.7	0.006	0.017
0.8	0.8	0.001	0.001
0.8	0.8	0.001	0.001
0.8	0.75	0.001	0.006
0.8	0.75	0.001	0.006
0.8	0.8	0.001	0.001
0.98	0.8	0.022	0.001
0.98	0.8	0.022	0.001
0.98	0.8	0.022	0.001
0.8	0.8	0.001	0.001
0.8	0.98	0.001	0.022
0.8	0.98	0.001	0.022
0.7	0.98	0.017	0.022
0.7	0.8	0.017	0.001
0.7	0.8	0.017	0.001
0.85	0.8	0.000	0.001
0.85	0.7	0.000	0.017
0.85	0.8	0.000	0.001
0.9	0.8	0.005	0.001
0.9	0.85	0.005	0.000
0.9	0.85	0.005	0.000
0.8	0.85	0.001	0.000
0.85	0.9	0.000	0.005
0.85	0.9	0.000	0.005
0.9	0.9	0.005	0.005

MEAN = 0.8306

VARIANCE = 0.01

STANDARD DEVIATION = 0.08

IRAQ COMBAT CAPABILITY

FIRE SUPPORT		(X - XBAR)Squared	
0.9	0.65	0.151	0.019
0.5	0.25	0.000	0.069
0.5	0.25	0.000	0.069
0.5	0.5	0.000	0.000
0.5	0.9	0.000	0.151
0.5	0.5	0.000	0.000
0.65	0.5	0.019	0.000
0.65	0.5	0.019	0.000
0.65	0.5	0.019	0.000
0.5	0.5	0.000	0.000
0.5	0.65	0.000	0.019
0.5	0.65	0.000	0.019
0.25	0.65	0.069	0.019
0.25	0.5	0.069	0.000
0.25	0.5	0.069	0.000
0.8	0.5	0.083	0.000
0.8	0.25	0.083	0.069
0.8	0.25	0.083	0.069
0.25	0.25	0.069	0.069
0.25	0.8	0.069	0.083
0.25	0.8	0.069	0.083
0.65	0.8	0.019	0.083
0.65	0.25	0.019	0.069
0.5	0.25	0.000	0.069
0.65	0.25	0.019	0.069

MEAN = 0.512

VARIANCE = 0.04

STANDARD DEVIATION = 0.20

KUWAIT COMBAT CAPABILITY

FIRE SUPPORT

(X - XBAR)Squared

0.35	0.2	0.012	0.001
0.35	0.2	0.012	0.001
0.35	0.33	0.012	0.008
0.35	0.33	0.012	0.008
0.35	0.35	0.012	0.012
0.25	0.35	0.000	0.012
0.33	0.35	0.008	0.012
0.33	0.35	0.008	0.012
0.33	0.35	0.008	0.012
0.1	0	0.019	0.057
0	0.33	0.057	0.008
0.33	0.33	0.008	0.008
0.2	0.33	0.001	0.008
0.2	0	0.001	0.057
0.2	0.25	0.001	0.000
0.3	0	0.004	0.057
0.3	0.2	0.004	0.001
0.3	0.2	0.004	0.001
0.1	0.2	0.019	0.001
0.1	0.3	0.019	0.004
0.1	0.3	0.019	0.004
0.3	0.3	0.004	0.004
0.1	0.1	0.019	0.019
0.1	0.1	0.019	0.019
0.35	0.1	0.012	0.019

MEAN = 0.2384

VARIANCE = 0.01

STANDARD DEVIATION = 0.11

SAUDI COMBAT CAPABILITY

FIRE
SUPPORT

(X - XBAR)Squared

0.35	0.65	0.023	0.022
0.3	0.65	0.041	0.022
0.3	0.65	0.041	0.022
0.3	0.6	0.041	0.009
0.3	0.35	0.041	0.023
0.3	0.3	0.041	0.041
0.65	0.3	0.022	0.041
0.65	0.3	0.022	0.041
0.65	0.3	0.022	0.041
0.6	0.3	0.009	0.041
0.6	0.65	0.009	0.022
0.6	0.65	0.009	0.022
0.6	0.65	0.009	0.022
0.6	0.6	0.009	0.009
0.6	0.6	0.009	0.009
0.6	0.6	0.009	0.009
0.6	0.6	0.009	0.009
0.6	0.6	0.009	0.009
0.6	0.6	0.009	0.009
0.6	0.6	0.009	0.009
0.6	0.6	0.009	0.009
0.6	0.3	0.009	0.041
0.6	0.6	0.009	0.009
0.3	0.6	0.041	0.009
0.3	0.6	0.041	0.009
0.3	0.3	0.041	0.041
0.3	0.6	0.041	0.009

MEAN = 0.503

VARIANCE = 0.02

STANDARD DEVIATION = 0.15

COALITION COMBAT CAPABILITY

FIRE SUPPORT		(X - XBAR)Squared	
0.9	0.95	0.000	0.001
0.9	0.65	0.000	0.073
0.9	0.9	0.000	0.000
0.9	0.9	0.000	0.000
0.9	0.9	0.000	0.000
0.9	0.9	0.073	0.000
0.95	0.9	0.001	0.000
0.95	0.9	0.001	0.000
0.95	0.9	0.001	0.000
0.9	0.65	0.000	0.073
0.9	0.95	0.000	0.001
0.9	0.95	0.000	0.001
0.9	0.95	0.000	0.001
0.95	0.9	0.001	0.000
0.9	0.9	0.000	0.000
1	0.95	0.006	0.001
1	0.95	0.006	0.001
1	0.95	0.006	0.001
0.95	0.95	0.001	0.001
0.95	1	0.001	0.006
0.95	1	0.001	0.006
0.95	1	0.001	0.006
0.95	0.95	0.001	0.001
0.95	0.95	0.001	0.001
1	0.95	0.006	0.001

MEAN = 0.92

VARIANCE = 0.01

STANDARD DEVIATION = 0.08

IRAQ COMBAT CAPABILITY

M.C.S.		(X - XBAR)Squared	
0.5	0.33	0.003	0.049
0.5	0.33	0.003	0.049
0.5	0.33	0.003	0.049
0.5	0.5	0.003	0.003
0.85	0.5	0.089	0.003
0.5	0.5	0.003	0.003
0.55	0.5	0.000	0.003
0.33	0.5	0.049	0.003
0.33	0.85	0.049	0.089
0.8	0.5	0.062	0.003
0.8	0.33	0.062	0.049
0.8	0.55	0.062	0.000
0.8	0.33	0.062	0.049
0.8	0.8	0.062	0.062
0.8	0.8	0.062	0.062
0.55	0.8	0.000	0.062
0.55	0.8	0.000	0.062
0.5	0.8	0.003	0.062
0.25	0.8	0.091	0.062
0.25	0.55	0.091	0.000
0.25	0.55	0.091	0.000
0.8	0.55	0.062	0.000
0.8	0.25	0.062	0.091
0.5	0.25	0.003	0.091
0.5	0.25	0.003	0.091

MEAN = 0.5512

VARIANCE = 0.04

STANDARD DEVIATION = 0.20

KUWAIT COMBAT CAPABILITY

M.C.S.		(X - XBAR)Squared	
0.4	0.6	0.017	0.108
0.4	0.1	0.017	0.029
0.6	0.25	0.108	0.000
0.4	0.4	0.017	0.017
0.4	0.4	0.017	0.017
0.4	0.4	0.017	0.017
0.25	0.6	0.000	0.108
0.25	0.4	0.000	0.017
0.25	0.4	0.000	0.017
0.1	0.4	0.029	0.017
0.1	0.25	0.029	0.000
0.1	0.25	0.029	0.000
0.1	0.25	0.029	0.000
0.1	0.1	0.029	0.029
0.1	0.1	0.029	0.029
0.4	0.1	0.017	0.029
0.4	0.1	0.017	0.029
0.4	0.1	0.017	0.029
0.1	0.1	0.029	0.029
0.1	0.4	0.029	0.017
0.1	0.4	0.029	0.017
0.4	0.4	0.017	0.017
0.4	0.1	0.017	0.029
0.4	0.1	0.017	0.029
0.1	0.1	0.029	0.029

MEAN = 0.271

VARIANCE = 0.02

STANDARD DEVIATION = 0.16

SAUDI COMBAT CAPABILITY

M.C.S.		(X - XBAR)Squared	
0.25	0.6	0.026	0.036
0.25	0.4	0.026	0.000
0.25	0.4	0.026	0.000
0.25	0.45	0.026	0.002
0.25	0.25	0.026	0.026
0.45	0.25	0.002	0.026
0.45	0.3	0.002	0.012
0.45	0.25	0.002	0.026
0.45	0.25	0.002	0.026
0.6	0.45	0.036	0.002
0.6	0.45	0.036	0.002
0.6	0.45	0.036	0.002
0.4	0.45	0.000	0.002
0.4	0.6	0.000	0.036
0.4	0.6	0.000	0.036
0.3	0.6	0.012	0.036
0.3	0.4	0.012	0.000
0.3	0.4	0.012	0.000
0.6	0.4	0.036	0.000
0.6	0.3	0.036	0.012
0.6	0.3	0.036	0.012
0.3	0.3	0.012	0.012
0.6	0.25	0.036	0.026
0.25	0.6	0.026	0.036
0.3	0.6	0.012	0.036

MEAN = 0.41

VARIANCE = 0.02

STANDARD DEVIATION = 0.13

COALITION COMBAT CAPABILITY -----

M.C.S.		(X - XBAR)Squared	
-----		-----	-----
0.75	0.75	0.010	0.010
0.75	0.5	0.010	0.122
0.75	0.9	0.010	0.003
0.75	0.75	0.010	0.010
0.75	0.75	0.010	0.010
0.5	0.75	0.122	0.010
1	0.75	0.023	0.010
1	0.75	0.023	0.010
1	0.75	0.023	0.010
1	0.5	0.023	0.122
1	1	0.023	0.023
1	0.7	0.023	0.023
0.9	1	0.003	0.023
0.9	1	0.003	0.023
0.9	1	0.003	0.023
0.7	1	0.023	0.023
0.9	0.9	0.003	0.003
0.9	0.9	0.003	0.003
0.95	0.9	0.010	0.003
0.95	0.9	0.010	0.003
0.95	0.9	0.010	0.003
0.9	0.7	0.003	0.023
0.7	0.95	0.023	0.010
1	0.95	0.023	0.010
0.7	0.95	0.023	0.010

MEAN = 0.85

VARIANCE = 0.02

STANDARD DEVIATION = 0.14

IRAQ COMBAT CAPABILITY

INTELLIGENCE		(X - XBAR)Squared	
0.25	0.2	0.002	0.008
0.25	0.2	0.002	0.008
0.25	0.25	0.002	0.002
0.25	0.4	0.002	0.012
0.4	0.25	0.012	0.002
0.25	0.25	0.002	0.002
0.33	0.25	0.002	0.002
0.33	0.25	0.002	0.002
0.33	0.4	0.002	0.012
0.2	0.25	0.008	0.002
0.2	0.33	0.008	0.002
0.2	0.33	0.008	0.002
0.2	0.33	0.008	0.002
0.2	0.2	0.008	0.008
0.2	0.2	0.008	0.008
0.5	0.2	0.044	0.008
0.5	0.2	0.044	0.008
0.5	0.2	0.044	0.008
0.25	0.2	0.002	0.008
0.25	0.5	0.002	0.044
0.25	0.5	0.002	0.044
0.4	0.4	0.012	0.012
0.2	0.25	0.008	0.002
0.5	0.25	0.044	0.002
0.33	0.25	0.002	0.002

MEAN = 0.2912

VARIANCE = 0.01

STANDARD DEVIATION = 0.10

KUWAIT COMBAT CAPABILITY

INTELLIGENCE		(X - XBAR)Squared	
0.3	0.35	0.001	0.008
0.3	0.3	0.001	0.001
0.3	0.45	0.001	0.035
0.35	0.4	0.008	0.019
0.3	0.3	0.001	0.001
0.3	0.3	0.001	0.001
0.45	0.3	0.035	0.001
0.45	0.35	0.035	0.008
0.45	0.3	0.035	0.001
0.4	0.3	0.019	0.001
0.4	0.45	0.019	0.035
0.4	0.45	0.019	0.035
0.1	0.45	0.027	0.035
0.1	0.4	0.027	0.019
0.1	0.4	0.027	0.019
0.1	0.4	0.027	0.019
0.1	0.1	0.027	0.027
0.1	0.1	0.027	0.027
0.1	0.1	0.027	0.027
0.1	0.1	0.027	0.027
0.1	0.1	0.027	0.027
0.1	0.1	0.027	0.027
0.45	0.1	0.035	0.027
0.1	0.1	0.027	0.027
0.1	0.1	0.027	0.027
0.4	0.1	0.019	0.027

MEAN = 0.263

VARIANCE = 0.02

STANDARD DEVIATION = 0.14

SAUDI COMBAT CAPABILITY

INTELLIGENCE		(X - XBAR)Squared	
0.4	0.4	0.020	0.020
0.4	0.5	0.020	0.002
0.4	0.5	0.020	0.002
0.4	0.7	0.020	0.026
0.4	0.4	0.020	0.020
0.5	0.4	0.002	0.020
0.7	0.4	0.026	0.020
0.7	0.4	0.026	0.020
0.7	0.4	0.026	0.020
0.7	0.5	0.026	0.002
0.7	0.7	0.026	0.026
0.7	0.7	0.026	0.026
0.8	0.7	0.068	0.026
0.8	0.7	0.068	0.026
0.8	0.7	0.068	0.026
0.3	0.7	0.058	0.026
0.3	0.8	0.058	0.068
0.3	0.8	0.058	0.068
0.6	0.8	0.004	0.068
0.6	0.3	0.004	0.058
0.6	0.3	0.004	0.058
0.3	0.3	0.058	0.058
0.6	0.6	0.004	0.004
0.3	0.5	0.058	0.002
0.3	0.5	0.058	0.002

MEAN = 0.54

VARIANCE = 0.03

STANDARD DEVIATION = 0.17

COALITION COMBAT CAPABILITY

INTELLIGENCE		(X - XBAR)Squared	
0.6	0.6	0.036	0.036
0.6	0.85	0.036	0.003
0.6	0.85	0.036	0.003
0.85	0.9	0.003	0.012
0.6	0.6	0.036	0.036
0.6	0.6	0.036	0.036
0.85	0.6	0.003	0.036
0.85	0.85	0.003	0.003
0.85	0.6	0.003	0.036
0.85	0.6	0.003	0.036
0.85	0.85	0.003	0.003
0.85	0.85	0.003	0.003
0.9	0.85	0.012	0.003
0.9	0.85	0.012	0.003
0.9	0.85	0.012	0.003
0.7	0.85	0.008	0.003
0.7	0.9	0.008	0.012
0.7	0.9	0.008	0.012
0.95	0.9	0.025	0.012
0.95	0.7	0.025	0.008
0.95	0.7	0.025	0.008
0.7	0.7	0.008	0.008
0.95	0.95	0.025	0.025
0.6	0.95	0.036	0.025
0.9	0.95	0.012	0.025

MEAN = 0.791

VARIANCE = 0.02

STANDARD DEVIATION = 0.13

IRAQ COMBAT CAPABILITY

MAINTENANCE		(X - XBAR)Squared	
0.5	0.5	0.014	0.014
0.25	0.25	0.017	0.017
0.25	0.5	0.017	0.014
0.25	0.7	0.017	0.102
0.25	0.5	0.017	0.014
0.25	0.25	0.017	0.017
0.25	0.25	0.017	0.017
0.25	0.25	0.017	0.017
0.25	0.25	0.017	0.017
0.5	0.25	0.014	0.017
0.5	0.25	0.014	0.017
0.5	0.25	0.014	0.017
0.7	0.25	0.102	0.017
0.7	0.5	0.102	0.014
0.7	0.5	0.102	0.014
0.4	0.5	0.000	0.014
0.4	0.7	0.000	0.102
0.4	0.5	0.000	0.014
0.25	0.7	0.017	0.102
0.25	0.4	0.017	0.000
0.25	0.25	0.017	0.017
0.4	0.4	0.000	0.000
0.4	0.25	0.000	0.017
0.25	0.25	0.017	0.017
0.25	0.25	0.017	0.017

MEAN = 0.38

VARIANCE = 0.02

STANDARD DEVIATION = 0.16

KUWAIT COMBAT CAPABILITY

MAINTENANCE		(X - XBAR)Squared	
0.6	0.6	0.046	0.046
0.3	0.3	0.007	0.007
0.3	0.33	0.007	0.003
0.3	0.6	0.007	0.046
0.3	0.6	0.007	0.046
0.3	0.3	0.007	0.007
0.33	0.3	0.003	0.007
0.33	0.3	0.003	0.007
0.33	0.3	0.003	0.007
0.6	0.3	0.046	0.007
0.6	0.33	0.046	0.003
0.6	0.33	0.046	0.003
0.3	0.33	0.007	0.003
0.3	0.6	0.007	0.046
0.3	0.6	0.007	0.046
0.3	0.6	0.007	0.046
0.75	0.3	0.132	0.007
0.75	0.3	0.132	0.007
0.1	0.3	0.082	0.007
0.1	0.75	0.082	0.132
0.1	0.75	0.082	0.132
0.3	0.75	0.007	0.132
0.75	0.1	0.132	0.082
0.1	0.1	0.082	0.082
0.1	0.1	0.082	0.082

MEAN = 0.3862

VARIANCE = 0.04

STANDARD DEVIATION = 0.20

SAUDI COMBAT CAPABILITY

MAINTENANCE		(X - XBAR)Squared	
0.5	0.5	0.001	0.001
0.3	0.3	0.029	0.029
0.3	0.4	0.029	0.005
0.3	0.4	0.029	0.005
0.3	0.5	0.029	0.001
0.3	0.3	0.029	0.029
0.5	0.3	0.001	0.029
0.5	0.3	0.001	0.029
0.5	0.3	0.001	0.029
0.5	0.5	0.001	0.001
0.5	0.5	0.001	0.001
0.4	0.5	0.005	0.001
0.4	0.5	0.005	0.001
0.4	0.5	0.005	0.001
0.6	0.5	0.017	0.001
0.6	0.4	0.017	0.005
0.6	0.4	0.017	0.005
0.6	0.4	0.017	0.005
0.6	0.6	0.017	0.017
0.6	0.6	0.017	0.017
0.5	0.6	0.001	0.017
0.6	0.6	0.017	0.017
0.6	0.6	0.017	0.017
0.6	0.6	0.017	0.017
MEAN = 0.47			
VARIANCE =		0.01	
STANDARD DEVIATION =		0.11	

COALITION COMBAT CAPABILITY

MAINTENANCE		(X - XBAR)Squared	
0.75	0.7	0.000	0.005
0.8	0.7	0.001	0.005
0.8	0.75	0.001	0.000
0.8	0.8	0.001	0.001
0.8	0.75	0.001	0.000
0.8	0.8	0.001	0.001
0.8	0.8	0.001	0.001
0.8	0.8	0.001	0.001
0.8	0.8	0.001	0.001
0.75	0.8	0.000	0.001
0.75	0.8	0.000	0.001
0.75	0.8	0.000	0.001
0.7	0.8	0.005	0.001
0.7	0.75	0.005	0.000
0.7	0.75	0.005	0.000
0.6	0.75	0.029	0.000
0.6	0.7	0.029	0.005
0.6	0.95	0.029	0.032
0.95	0.7	0.032	0.005
0.95	0.6	0.032	0.029
0.95	0.8	0.032	0.001
0.75	0.6	0.000	0.029
0.7	0.95	0.005	0.032
0.7	0.95	0.005	0.032
0.7	0.95	0.005	0.032
0.6			
MEAN = 0.771			
VARIANCE =		0.01	
STANDARD DEVIATION =		0.09	

IRAQ COMBAT CAPABILITY

COMMAND AND CONTROL

(X - XBAR)Squared

0.4	0.4	0.001	0.001
0.4	0.33	0.001	0.010
0.4	0.25	0.001	0.032
0.4	0.6	0.001	0.029
0.4	0.4	0.001	0.001
0.4	0.4	0.001	0.001
0.33	0.4	0.010	0.001
0.33	0.4	0.010	0.001
0.33	0.4	0.010	0.001
0.25	0.4	0.032	0.001
0.25	0.33	0.032	0.010
0.25	0.33	0.032	0.010
0.6	0.33	0.029	0.010
0.6	0.25	0.029	0.032
0.6	0.25	0.029	0.032
0.75	0.25	0.102	0.032
0.75	0.6	0.102	0.029
0.75	0.6	0.102	0.029
0.25	0.6	0.032	0.029
0.25	0.75	0.032	0.102
0.75	0.75	0.102	0.102
0.25	0.6	0.032	0.029
0.25	0.25	0.032	0.032
0.6	0.25	0.029	0.032
0.6	0.25	0.029	0.032

MEAN = 0.4302

VARIANCE = 0.03

STANDARD DEVIATION = 0.17

KUWAIT COMBAT CAPABILITY

COMMAND AND CONTROL

(X - XBAR)Squared

0.4	0.4	0.001	0.001
0.4	0.5	0.001	0.004
0.4	0.5	0.001	0.004
0.4	0.5	0.001	0.004
0.4	0.4	0.001	0.001
0.4	0.4	0.001	0.001
0.5	0.4	0.004	0.001
0.5	0.4	0.004	0.001
0.5	0.4	0.004	0.001
0.5	0.4	0.004	0.001
0.5	0.5	0.004	0.004
0.5	0.5	0.004	0.004
0.6	0.5	0.028	0.004
0.6	0.5	0.028	0.004
0.6	0.5	0.028	0.004
0.6	0.5	0.028	0.004
0.6	0.6	0.028	0.028
0.6	0.6	0.028	0.028
0.1	0.6	0.112	0.028
0.1	0.6	0.112	0.028
0.1	0.6	0.112	0.028
0.5	0.6	0.004	0.028
0.5	0.1	0.004	0.112
0.1	0.1	0.112	0.112
0.1	0.1	0.112	0.112

MEAN = 0.434

VARIANCE = 0.03

STANDARD DEVIATION = 0.16

SAUDI COMBAT CAPABILITY

COMMAND AND CONTROL

(X - XBAR)Squared

0.45	0.5	0.020	0.008
0.45	0.45	0.020	0.020
0.45	0.65	0.020	0.004
0.45	0.4	0.020	0.036
0.5	0.45	0.008	0.020
0.45	0.45	0.020	0.020
0.65	0.45	0.004	0.020
0.65	0.45	0.004	0.020
0.65	0.5	0.004	0.008
0.4	0.45	0.036	0.020
0.4	0.65	0.036	0.004
0.4	0.65	0.036	0.004
0.8	0.65	0.044	0.004
0.8	0.4	0.044	0.036
0.8	0.4	0.044	0.036
0.7	0.4	0.012	0.036
0.7	0.8	0.012	0.044
0.7	0.8	0.012	0.044
0.6	0.8	0.000	0.044
0.6	0.7	0.000	0.012
0.6	0.7	0.000	0.012
0.8	0.7	0.044	0.012
0.7	0.6	0.012	0.000
0.8	0.6	0.044	0.000
0.8	0.6	0.044	0.000

MEAN = 0.59

VARIANCE = 0.02

STANDARD DEVIATION = 0.14

COALITION COMBAT CAPABILITY

COMMAND AND CONTROL

(X-XBAR)SQUARED

0.7	0.85	0.014	0.001
0.85	0.7	0.001	0.014
0.7	0.7	0.014	0.014
0.7	0.7	0.014	0.014
0.7	0.7	0.014	0.014
0.7	0.85	0.014	0.001
0.95	0.7	0.017	0.014
0.95	0.7	0.017	0.014
0.95	0.7	0.017	0.014
0.75	0.7	0.005	0.014
0.8	0.95	0.000	0.017
0.75	0.95	0.005	0.017
0.9	0.95	0.008	0.017
0.9	0.75	0.008	0.005
0.9	0.9	0.008	0.008
0.8	0.75	0.000	0.005
0.8	0.9	0.000	0.008
0.8	0.9	0.000	0.008
0.9	0.9	0.008	0.008
0.9	0.8	0.008	0.000
0.9	0.8	0.008	0.000
0.8	0.8	0.000	0.000
0.9	0.9	0.008	0.008
0.75	0.9	0.005	0.008
0.9	0.9	0.008	0.008

MEAN = 0.82

VARIANCE = 0.01

STANDARD DEVIATION = 0.09

IRAQ COMBAT CAPABILITY

AIR DEFENSE

(X-XBAR)SQUARED

0.4	0.6	0.000	0.036
0.4	0.35	0.000	0.004
0.4	0.45	0.000	0.002
0.4	0.4	0.000	0.000
0.4	0.4	0.000	0.000
0.4	0.4	0.000	0.000
0.45	0.4	0.002	0.000
0.45	0.4	0.002	0.000
0.45	0.4	0.002	0.000
0.4	0.4	0.000	0.000
0.4	0.45	0.000	0.002
0.4	0.45	0.000	0.002
0.6	0.45	0.036	0.002
0.6	0.4	0.036	0.000
0.6	0.4	0.036	0.000
0.35	0.4	0.004	0.000
0.35	0.6	0.004	0.036
0.35	0.6	0.004	0.036
0.25	0.6	0.026	0.036
0.25	0.35	0.026	0.004
0.25	0.35	0.026	0.004
0.35	0.35	0.004	0.004
0.6	0.25	0.036	0.026
0.35	0.35	0.004	0.004
0.25	0.25	0.026	0.026

MEAN = 0.411

VARIANCE = 0.01

STANDARD DEVIATION = 0.10

KUWAIT COMBAT CAPABILITY

AIR DEFENSE

(X-XBAR)SQUARED

0.2	0.25	0.002	0.000
0.25	0.25	0.000	0.000
0.25	0.5	0.000	0.066
0.25	0.2	0.000	0.002
0.25	0.2	0.000	0.002
0.25	0.25	0.000	0.000
0.5	0.25	0.066	0.000
0.5	0.25	0.066	0.000
0.5	0.25	0.066	0.000
0.2	0.25	0.002	0.000
0.2	0.5	0.002	0.066
0.2	0.5	0.002	0.066
0.1	0.5	0.021	0.066
0.1	0.2	0.021	0.002
0.1	0.2	0.021	0.002
0.3	0.2	0.003	0.002
0.3	0.1	0.003	0.021
0.3	0.1	0.003	0.021
0.1	0.1	0.021	0.021
0.1	0.3	0.021	0.003
0.1	0.3	0.021	0.003
0.1	0.3	0.021	0.003
0.3	0.1	0.003	0.021
0.3	0.1	0.003	0.021
0.2	0.1	0.002	0.021

MEAN = 0.244

VARIANCE = 0.02

STANDARD DEVIATION = 0.12

SAUDI COMBAT CAPABILITY

AIR DEFENSE

(X-XBAR)SQUARED

0.25	0.4	0.053	0.007
0.3	0.6	0.033	0.014
0.3	0.6	0.033	0.014
0.3	0.6	0.033	0.014
0.3	0.25	0.033	0.053
0.3	0.3	0.033	0.033
0.7	0.3	0.048	0.033
0.7	0.3	0.048	0.033
0.7	0.3	0.048	0.033
0.5	0.3	0.000	0.033
0.5	0.7	0.000	0.048
0.5	0.7	0.000	0.048
0.6	0.7	0.014	0.048
0.6	0.5	0.014	0.000
0.6	0.5	0.014	0.000
0.4	0.5	0.007	0.000
0.4	0.6	0.007	0.014
0.4	0.6	0.007	0.014
0.6	0.6	0.014	0.014
0.6	0.4	0.014	0.007
0.6	0.4	0.014	0.007
0.5	0.4	0.000	0.007
0.4	0.6	0.007	0.014
0.4	0.6	0.007	0.014
0.25	0.6	0.053	0.014

MEAN = 0.481

VARIANCE = 0.02

STANDARD DEVIATION = 0.14

COALITION COMBAT CAPABILITY

AIR DEFENSE

(X-XBAR)SQUARED

0.75	0.85	0.020	0.002
0.9	0.85	0.000	0.002
0.9	0.85	0.000	0.002
0.9	0.9	0.000	0.000
0.9	0.75	0.000	0.020
0.9	0.9	0.000	0.000
0.85	0.9	0.002	0.000
0.85	0.9	0.002	0.000
0.85	0.9	0.002	0.000
0.9	0.9	0.000	0.000
0.9	0.85	0.000	0.002
0.9	0.85	0.000	0.002
0.9	0.85	0.000	0.002
0.8	0.9	0.008	0.000
0.8	0.9	0.008	0.000
1	0.9	0.012	0.000
0.9	0.8	0.000	0.008
1	0.9	0.012	0.000
0.95	0.8	0.004	0.008
0.95	1	0.004	0.012
0.95	1	0.004	0.012
0.8	0.85	0.008	0.002
0.9	0.95	0.000	0.004
0.95	0.95	0.004	0.004
0.95	0.95	0.004	0.004

MEAN = 0.89

VARIANCE = 0.00

STANDARD DEVIATION = 0.06

IRAQ COMBAT CAPABILITY			
INDIVIDUAL TRAINING		(X-XBAR)SQUARED	
0.45	0.3	0.029	0.000
0.45	0.3	0.029	0.000
0.45	0.3	0.029	0.000
0.15	0.25	0.017	0.001
0.45	0.45	0.029	0.029
0.45	0.45	0.029	0.029
0.25	0.45	0.001	0.029
0.25	0.15	0.001	0.017
0.25	0.45	0.001	0.029
0.25	0.45	0.001	0.029
0.25	0.25	0.001	0.001
0.25	0.25	0.001	0.001
0.3	0.3	0.000	0.000
0.3	0.25	0.000	0.001
0.3	0.25	0.000	0.001
0.1	0.25	0.032	0.001
0.1	0.3	0.032	0.000
0.1	0.4	0.032	0.014
0.25	0.3	0.001	0.000
0.25	0.1	0.001	0.032
0.25	0.25	0.001	0.001
0.15	0.1	0.017	0.032
0.15	0.25	0.017	0.001
0.15	0.25	0.017	0.001
0.4	0.25	0.014	0.001
MEAN = 0.28			
VARIANCE = 0.01			
STANDARD DEVIATION = 0.11			

KUWAIT COMBAT CAPABILITY

**INDIVIDUAL
TRAINING**

(X-XBAR) SQUARED

0.55	0.4	0.039	0.002
0.3	0.1	0.003	0.063
0.3	0.1	0.003	0.063
0.3	0.1	0.003	0.063
0.3	0.55	0.003	0.039
0.3	0.3	0.003	0.003
0.33	0.3	0.000	0.003
0.33	0.3	0.000	0.003
0.33	0.3	0.000	0.003
0.7	0.3	0.121	0.003
0.7	0.33	0.121	0.000
0.7	0.33	0.121	0.000
0.5	0.33	0.022	0.000
0.5	0.7	0.022	0.121
0.5	0.7	0.022	0.121
0.4	0.7	0.002	0.121
0.4	0.5	0.002	0.022
0.4	0.5	0.002	0.022
0.1	0.5	0.063	0.022
0.1	0.4	0.063	0.002
0.1	0.4	0.063	0.002
0.1	0.4	0.063	0.002
0.3	0.1	0.003	0.063
0.1	0.1	0.063	0.063
0.1	0.1	0.063	0.063

MEAN = 0.3516

VARIANCE = 0.03

STANDARD DEVIATION = 0.19

SAUDI COMBAT CAPABILITY			
INDIVIDUAL			
TRAINING			
		(X-XBAR)SQUARED	
0.25	0.6	0.078	0.005
0.6	0.6	0.005	0.005
0.25	0.5	0.078	0.001
0.25	0.5	0.078	0.001
0.25	0.25	0.078	0.078
0.25	0.6	0.078	0.005
0.33	0.25	0.040	0.078
0.33	0.25	0.040	0.078
0.33	0.4	0.040	0.017
0.6	0.25	0.005	0.078
0.6	0.33	0.005	0.040
0.6	0.5	0.005	0.001
0.5	0.33	0.001	0.040
0.5	0.6	0.001	0.005
0.5	0.6	0.001	0.005
0.8	0.6	0.073	0.005
0.8	0.5	0.073	0.001
0.8	0.8	0.073	0.073
0.6	0.5	0.005	0.001
0.6	0.8	0.005	0.073
0.6	0.8	0.005	0.073
0.8	0.8	0.073	0.073
0.8	0.6	0.073	0.005
0.8	0.6	0.073	0.005
0.6	0.6	0.005	0.005
MEAN	-	0.53	
VARIANCE	-	0.03	
STANDARD DEVIATION	-	0.19	

INDIVIDUAL TRAINING	COALITION COMBAT CAPABILITY		
		(X-XBAR) SQUARED	
0.8	0.85	0.004	0.000
0.8	0.7	0.004	0.028
0.8	0.7	0.004	0.028
0.85	0.7	0.000	0.028
0.8	0.8	0.004	0.004
0.8	0.8	0.004	0.004
0.98	0.8	0.014	0.004
0.98	0.85	0.014	0.000
0.98	0.8	0.014	0.004
0.85	0.8	0.000	0.004
0.85	0.98	0.000	0.014
0.85	0.98	0.000	0.014
0.8	0.98	0.004	0.014
0.85	0.85	0.000	0.000
0.7	0.85	0.028	0.000
0.95	0.85	0.008	0.000
0.95	0.9	0.008	0.002
0.95	0.9	0.008	0.002
0.9	0.8	0.002	0.004
0.9	0.95	0.002	0.008
0.95	0.95	0.008	0.008
0.7	0.95	0.028	0.008
0.7	0.9	0.028	0.002
0.95	0.9	0.008	0.002
0.95	0.9	0.008	0.002
MEAN = 0.8606			
VARIANCE = 0.01			
STANDARD DEVIATION = 0.09			

APPENDIX VI

QUESTIONNAIRE

PLEASE PRINT YOUR RESPONSES IN THE SPACE PROVIDED BELOW EACH QUESTION.

1. ENTER YOUR YEARS OF ACTIVE FEDERAL SERVICE

2. ENTER YOUR BRANCH OF SERVICE (ARMY, NAVY . . .)

3. IF ARMY, ENTER YOUR BASIC BRANCH (INFANTRY, ARMOR . . .)

4. HAVE YOU EVER HELD A COMMAND POSITION? (YES OR NO)

5. IF YOU ANSWERED YES TO NUMBER 4, ENTER THE TOTAL NUMBER OF YEARS AND MONTHS YOU HAVE BEEN IN A COMMAND POSITION(S). (EXAMPLE 2/11 FOR TWO YEARS AND ELEVEN MONTHS)

_____/_____

6. ENTER YOUR SOURCE OF COMMISSION, (SERVICE ACADEMY, ROTC
OCS, OTHER)

LISTED BELOW ARE ELEMENTS AND SUB-ELEMENTS OF THE
BATTLEFIELD OPERATING SYSTEM, THE PRINCIPLES OF WAR AND
BATTLE ANALYSIS. THEY ARE NOT LISTED IN ANY PARTICULAR
ORDER.

MANEUVER	C2	INDIVIDUAL TRAINING
SUSTAINMENT	MAINTENANCE	UNIT LEVEL TRAINING
FIRE SUPPORT	MOBILITY, COUNTERMOBILITY,	
INTELLIGENCE	SURVIVABILITY (MCS)	AIR DEFENSE

FROM MISSION RECEIPT THROUGH MISSION COMPLETION, EACH
OF THE ABOVE ELEMENTS WILL EFFECT THE OVERALL OUTCOME OF A
MISSION IN TERMS OF SUCCESS OR FAILURE.

A DEFINITION AND RATING SCALE FOR EACH OF THESE
ELEMENTS IS PROVIDED ON PAGES 7 THROUGH 11.

ON THE FOLLOWING PAGES YOU ARE ASKED TO PROVIDE YOUR
BEST MILITARY JUDGEMENT, UTILIZING THE RATING SCALES
PROVIDED, CONCERNING THE CAPABILITIES OF THE ARMED FORCES OF
IRAQ, KUWAIT AND SAUDI ARABIA PRIOR TO THE IRAQI INVASION OF
KUWAIT IN AUGUST OF 1990. THE NEXT SECTION ASKS THE SAME
QUESTIONS, USING THE SAME RATING SCALE, FOR THE COALITION
FORCES ARRAYED AGAINST IRAQ ON 15 JANUARY 1991.

PROCEED TO THE NEXT PAGE AND BEGIN WITH YOUR
ASSESSMENT.

QUESTION 1 - IRAQ

USING THE DEFINITIONS AND RATING SCALES PROVIDED ON PAGES 7
THROUGH 11, RATE THE IRAQI FORCES, PRIOR TO THEIR INVASION
OF KUWAIT, FOR EACH OF THE ELEMENTS BELOW.

MANEUVER	C2	INDIVIDUAL TRAINING
SUSTAINMENT	MAINTENANCE	UNIT LEVEL TRAINING
FIRE SUPPORT	MOBILITY, COUNTERMOBILITY,	
INTELLIGENCE	SURVIVABILITY (MCS)	AIR DEFENSE

IRAQI ARMED FORCES (PRIOR TO THE INVASION OF KUWAIT)

0.00 IS THE LOWEST SCORE - 1.00 IS THE HIGHEST SCORE

MANEUVER _____ (0.00 TO 1.00)
COMMAND AND CONTROL _____ (0.00 TO 1.00)
SUSTAINMENT _____ (0.00 TO 1.00)
UNIT LEVEL TRAINING _____ (0.00 TO 1.00)
FIRE SUPPORT _____ (0.00 TO 1.00)
MOBILITY, COUNTERMOBILITY, SURVIVABILITY _____
(0.00 TO 1.00)
INTELLIGENCE _____ (0.00 TO 1.00)
MAINTENANCE _____ (0.00 TO 1.00)
AIR DEFENSE _____ (0.00 TO 1.00)
INDIVIDUAL TRAINING _____ (0.00 TO 1.00)

QUESTION 2 - KUWAIT

USING THE DEFINITIONS AND RATING SCALES PROVIDED ON PAGES 7
THROUGH 11, RATE THE KUWAITI FORCES, PRIOR TO IRAQ'S
INVASION, FOR EACH OF THE ELEMENTS BELOW.

MANEUVER	C2	INDIVIDUAL TRAINING
SUSTAINMENT	MAINTENANCE	UNIT LEVEL TRAINING
FIRE SUPPORT	MOBILITY, COUNTERMOBILITY,	
INTELLIGENCE	SURVIVABILITY (MCS)	AIR DEFENSE

KUWAITI ARMED FORCES (PRIOR TO THE INVASION OF KUWAIT)

MANEUVER _____ (0.00 TO 1.00)
COMMAND AND CONTROL _____ (0.00 TO 1.00)
SUSTAINMENT _____ (0.00 TO 1.00)
UNIT LEVEL TRAINING _____ (0.00 TO 1.00)
FIRE SUPPORT _____ (0.00 TO 1.00)
MOBILITY, COUNTERMOBILITY, SURVIVABILITY _____
(0.00 TO 1.00)
INTELLIGENCE _____ (0.00 TO 1.00)
MAINTENANCE _____ (0.00 TO 1.00)
AIR DEFENSE _____ (0.00 TO 1.00)
INDIVIDUAL TRAINING _____ (0.00 TO 1.00)

QUESTION 3 - SAUDI ARABIA

USING THE DEFINITIONS AND RATING SCALES PROVIDED ON PAGES 7
THROUGH 11, RATE THE SAUDI FORCES, PRIOR TO IRAQ'S INVASION
OF KUWAIT, FOR EACH OF THE ELEMENTS BELOW.

MANEUVER	C2	INDIVIDUAL TRAINING
SUSTAINMENT	MAINTENANCE	UNIT LEVEL TRAINING
FIRE SUPPORT	MOBILITY, COUNTERMOBILITY,	
INTELLIGENCE	SURVIVABILITY (MCS)	AIR DEFENSE

SAUDI ARMED FORCES (PRIOR TO THE INVASION OF KUWAIT)

MANEUVER _____ (0.00 TO 1.00)

COMMAND AND CONTROL _____ (0.00 TO 1.00)

SUSTAINMENT _____ (0.00 TO 1.00)

UNIT LEVEL TRAINING _____ (0.00 TO 1.00)

FIRE SUPPORT _____ (0.00 TO 1.00)

MOBILITY, COUNTERMOBILITY, SURVIVABILITY _____
(0.00 TO 1.00)

INTELLIGENCE _____ (0.00 TO 1.00)

MAINTENANCE _____ (0.00 TO 1.00)

AIR DEFENSE _____ (0.00 TO 1.00)

INDIVIDUAL TRAINING _____ (0.00 TO 1.00)

QUESTION 4 - COALITION FORCES

USING THE DEFINITIONS AND RATING SCALES PROVIDED ON PAGES 7
THROUGH 11, RATE THE COALITION FORCES, AS A WHOLE, ON 15
JANUARY 1991, FOR EACH OF THE ELEMENTS BELOW.

MANEUVER	C2	INDIVIDUAL TRAINING
SUSTAINMENT		UNIT LEVEL TRAINING
FIRE SUPPORT	MOBILITY, COUNTERMOBILITY,	
INTELLIGENCE	SURVIVABILITY (MCS)	AIR DEFENSE

COALITION FORCES (15 JANUARY 1991)

MANEUVER _____ (0.00 TO 1.00)
COMMAND AND CONTROL _____ (0.00 TO 1.00)
SUSTAINMENT _____ (0.00 TO 1.00)
UNIT LEVEL TRAINING _____ (0.00 TO 1.00)
FIRE SUPPORT _____ (0.00 TO 1.00)
MOBILITY, COUNTERMOBILITY, SURVIVABILITY _____
(0.00 TO 1.00)
INTELLIGENCE _____ (0.00 TO 1.00)
MAINTENANCE _____ (0.00 TO 1.00)
AIR DEFENSE _____ (0.00 TO 1.00)
INDIVIDUAL TRAINING _____ (0.00 TO 1.00)

OPERATIONAL DEFINITIONS

AND

RATING SCALES

1. MANEUVER - THE MOVEMENT OF GROUND AND AIR FORCES IN RELATION TO THE ENEMY TO SECURE OR RETAIN A POSITIONAL ADVANTAGE. AN ATTEMPT TO GAIN THE ADVANTAGE OF POSITION BEFORE BATTLE AND TO EXPLOIT SUCCESS TO ACHIEVE OPERATIONAL RESULTS. THIS VARIABLE IS SCALED IN 1/100s FROM 0.00 TO 1.00.

A FORCE WHICH IS ABLE TO POSITION ITS WEAPONS, SUPPORTING EQUIPMENT AND PERSONNEL REPEATEDLY OVER DURATION OF A CAMPAIGN, PRIOR TO THE INITIAL OR NEXT BATTLE, WOULD RECEIVE A SCORE OF 1.00. A FORCE THAT IS NEVER ABLE TO ACHIEVE THESE CONDITIONS WOULD RECEIVE A SCORE OF 0.00. A FORCE WHICH HAS SOME DEGREE OF SUCCESS IN MANEUVER WOULD RECEIVE A SCORE RANGING FROM .01 TO .99.

2. SUSTAINMENT - THE ABILITY TO PROVIDE THE FORCE WITH PERSONNEL, AMMUNITION, FUEL, FOOD, TRANSPORTATION AND REPAIR OF DAMAGED EQUIPMENT. THIS VARIABLE IS SCALED IN 1/100s FROM 0.00 TO 1.00. A SUSTAINMENT OPERATION THAT IS CONTINUOUSLY ABLE TO PROVIDE ITS FORCES WITH PERSONNEL, AMMUNITION, FUEL, FOOD, TRANSPORTATION AND REPAIR OF DAMAGED EQUIPMENT WOULD RECEIVE A SCORE OF 1.00.

A SUSTAINMENT OPERATION THAT IS UNABLE TO PROVIDE ANY OF THESE ELEMENTS AFTER THE INITIATION OF HOSTILITIES WOULD

DEFINITIONS AND SCALES (CONTINUED)

RECEIVE A 0.00. A SUSTAINMENT OPERATION THAT WAS ABLE TO PROVIDE A PORTION OF THE REQUIRED ELEMENTS WOULD RECEIVE A SCORE RANGING FROM .01 TO .99.

3. FIRE SUPPORT - THE ABILITY TO INTEGRATE ANY AND ALL FORMS OF SUPPORTING FIRES FROM MORTARS, ARTILLERY, ROCKETS, NAVAL GUNS AND AERIAL DELIVERED WEAPONS INTO THE EXECUTION OF A COMBAT MISSION.

THIS VARIABLE IS SCALED IN 1/100s FROM 0.00 TO 1.00. A FORCE WHICH IS CONSISTENTLY ABLE TO INTEGRATE ALL REQUIRED FORMS OF FIRE SUPPORT INTO A COMBAT OPERATION WOULD RECEIVE A SCORE OF 1.00. A FORCE WHICH IS NEVER ABLE TO INTEGRATE SUPPORTING FIRES WOULD RECEIVE A SCORE OF 0.00.

A FORCE WHICH IS ABLE TO INTEGRATE SUPPORTING FIRES ON AN OCCASIONAL BASIS WOULD RECEIVE A SCORE RANGING FROM .01 TO .99.

4. INTELLIGENCE - A MULTI-ECHELONED ORGANIZATION THAT IS CAPABLE OF PERFORMING MECHANICAL AND HUMAN COLLECTION OF INFORMATION REGARDING THE ENEMY, WEATHER AND TERRAIN RELEVANT TO COMBAT OPERATIONS; ANALYZE THE COLLECTED INFORMATION AND PROVIDE OPERATIONAL DECISION MAKERS WITH TIMELY, ACCURATE INTERPRETATIONS OF THE DATA. THIS VARIABLE IS SCALED IN 1/100S FROM 0.00 TO 1.00.

AN INTELLIGENCE ORGANIZATION THAT ALWAYS PROVIDES ITS DECISION MAKERS WITH AN ACCURATE ESTIMATE OF CURRENT AND FUTURE ENEMY SITUATIONS WOULD RECEIVE A SCORE OF 1.00. AN

DEFINITIONS AND SCALES (CONTINUED)

INTELLIGENCE ORGANIZATION THAT IS INCAPABLE OF PROVIDING THIS TYPE OF INFORMATION WOULD RECEIVE A SCORE OF 0.00. AN INTELLIGENCE ORGANIZATION THAT COULD OCCASIONALLY PROVIDE THIS TYPE OF INFORMATION WOULD RECEIVE A SCORE RANGING FROM .01 TO .99.

5. INDIVIDUAL TRAINING - THE FORMAL CIVILIAN EDUCATION COMBINED WITH THE PROFESSIONAL MILITARY EDUCATION AND MILITARY OCCUPATIONAL TRAINING OF AN INDIVIDUAL SOLDIER. A FORCE THAT IS COMPOSED OF OFFICERS, NONCOMMISSIONED OFFICERS AND ENLISTED SOLDIERS WITH THE FOLLOWING QUALIFICATIONS WOULD RECEIVE A SCORE OF 1.00: ENLISTED SOLDIERS AND NONCOMMISSIONED OFFICERS WHO HAVE ALL COMPLETED CIVILIAN EDUCATION AT THE 12th GRADE LEVEL, BEEN TRAINED AND QUALIFIED THROUGH STANDARDIZED TESTS IN THEIR MILITARY OCCUPATIONAL SPECIALITIES AND HAVE SUCCESSFULLY COMPLETED ALL OF THE PROFESSIONAL MILITARY EDUCATION REQUIRED FOR THEIR RANK AND GRADE. OFFICERS WHO HAVE RECEIVED A MINIMUM OF A BACCALAUREATE DEGREE FROM AN APPROVED, DEGREE GRANTING INSTITUTION, COMPLETED ALL OF THE PROFESSIONAL MILITARY EDUCATION REQUIRED FOR THEIR RANK AND GRADE AND SUCCESSFULLY COMPLETED ALL TRAINING ASSOCIATED WITH THEIR SPECIALITY.

A FORCE COMPRISED OF OFFICERS, NONCOMMISSIONED OFFICERS AND ENLISTED SOLDIERS WHO HAVE NO FORMAL PROFESSIONAL MILITARY TRAINING OR EDUCATION WOULD RECEIVE A SCORE OF 0.00. A FORCE WHOSE PERSONNEL POSSESSED SOME OF THE

DEFINITIONS AND SCALES (CONTINUED)

ATTRIBUTES DESCRIBED IN ASSOCIATION WITH A FULLY TRAINED INDIVIDUAL WOULD RECEIVE A SCORE BETWEEN .01 AND .99.

6. UNIT LEVEL TRAINING - A FULLY TRAINED UNIT IS ONE THAT HAS ITS FULL COMPLIMENT OF EQUIPMENT AND PERSONNEL. THIS UNIT HAS TRAINED AGAINST A POTENTIAL THREAT THAT IS SIMILAR TO THE NEXT OPPONENT IT WILL BE REQUIRED TO FACE IN TERMS OF DOCTRINE, EQUIPMENT AND TACTICS. A FULLY TRAINED UNIT HAS HAD THE OPPORTUNITY TO TRAIN AS PART OF A FORCE THAT CONTAINS UNITS OF ITS OWN SIZE AND AT LEAST OF THE NEXT LARGER ECHELON. THIS FULLY TRAINED UNIT WOULD RECEIVE A SCORE OF 1.00. A FORCE WHICH MEETS NONE OF THESE CONDITIONS WOULD RECEIVE A SCORE OF 0.00. A FORCE MEETING SOME OF THESE CONDITIONS WOULD RECEIVE A SCORE BETWEEN .01 AND .99.

7. MAINTENANCE - A UNIT WHICH IS FULLY TRAINED AND EQUIPPED TO PREFORM ALL OF THE REQUIRED MAINTENANCE ON ALL OF ITS WEAPONS AND EQUIPMENT, AND ROUTINELY PERFORMS THE REQUIRED MAINTENANCE, WOULD RECEIVE A SCORE OF 1.00. UNITS WITH NEITHER THE TRAINING OR EQUIPMENT TO PERFORM REQUIRED MAINTENANCE WOULD RECEIVE A 0.00. UNITS WHICH HAVE SOME CAPABILITY AND PREFORM SOME MAINTENANCE WOULD BE SCORED BETWEEN .01 AND .99.

8. COMMAND AND CONTROL (C2) - A FULLY FUNCTIONAL COMMAND AND CONTROL SYSTEM IS ONE WHICH ENABLES ITS USERS TO COMMUNICATE ORDERS, COORDINATE SUPPORT AND PROVIDE DIRECTION TO ITS FORCES IN SPITE OF ENEMY INTERFERENCE. A C2 SYSTEM

DEFINITIONS AND SCALES (CONTINUED)

WHICH IS CAPABLE OF PERFORMING THOSE FUNCTIONS WOULD RECEIVE A SCORE OF 1.0 A C2 SYSTEM WHICH IS INCAPABLE OF PERFORMING ANY OF THOSE FUNCTIONS WOULD RECEIVE A SCORE OF 0.00. C2 SYSTEMS WHICH ARE CAPABLE OF A DEGREE OF SUCCESS WOULD BE SCORED BETWEEN .01 AND .99.

9. MOBILITY, COUNTERMOBILITY, SURVIVABILITY (MCS) - A UNIT THAT IS CONSISTENTLY ABLE TO EMPLOY ITS ENGINEERS TO PRESERVE THE FREEDOM OF MANEUVER FOR FRIENDLY FORCES, RESTRICT THE MANEUVER OF ENEMY FORCES (OBSTACLES AND BARRIERS) AND PROTECT FRIENDLY FORCES THROUGH THE EMPLOYMENT OF PROTECTIVE CONSTRUCTION (BERMS, OVERHEAD COVER) WOULD RECEIVE A SCORE OF 1.00. UNITS WITH NONE OF THESE MCS CAPABILITIES WOULD RECEIVE A SCORE OF 0.00. UNITS WHICH COULD PERFORM SOME OF THE MCS FUNCTIONS WOULD BE SCORED BETWEEN .01 AND .99

10. AIR DEFENSE - A UNIT THAT IS ABLE TO PROVIDE BOTH POINT AND AREA AIR DEFENSE AT LOW, MEDIUM AND HIGH ALTITUDES WITH BOTH GROUND AND AIRBORNE SYSTEMS TO THE EXTENT THAT NO ENEMY AIR POWER IS CAPABLE OF ACHIEVING EITHER LOCAL AIR SUPERIORITY OR ABLE TO PENETRATE THE AIR DEFENSE NETWORK TO DELIVER THEIR MUNITIONS WOULD RECEIVE A SCORE OF 1.00. A UNIT THAT IS TOTALLY INCAPABLE OF PROVIDING AIR DEFENSE COVERAGE WOULD RECEIVE A SCORE OF 0.00. UNITS WHICH CAN PERFORM SOME OF THE FUNCTIONS DESCRIBED ABOVE WOULD BE SCORED BETWEEN .01 AND .99.

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